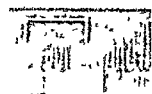


WAVELENGTHS OF ELECTROMAGNETIC RADIATION

	1,000,000,000,000,000,000
	100,000,000,000,000,000
RAY	10,000,000,000,000,000
	1,000,000,000,000,000
X-RAY	100,000,000,000,000
	10,000,000,000,000
ULTRA VIOLET	1,000,000,000,000
VISIBLE RAYS	100,000,000,000
HEAT RAYS	10,000,000,000
	1,000,000,000
$E = h\nu$	100,000,000
WAVELENGTH	10,000,000
	1,000,000
$f = \frac{c}{\lambda}$	100,000
	10,000
	1,000
	100
	10
	1



THE NEW EDUCATOR ENCYCLOPEDIA

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1937

DOMINION RESEARCH FOUNDATION
CALCUTTA

PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable.

S is always soft, and never has the sound of *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (Bach, ba*K*).

N for the French *n*, as in Breton: (Breton, bre to*N*).

ö for the German *o*, as in Gottingen: (Gottingen, go'ting en).

ü for the German *u*, as in Blücher: (Blücher, blu*K*'ur).

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MCMXXXVI

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PLANET. When we look at the heavens on a clear night we see a few very bright stars which shine with a steady light. These so-called stars are not stars at all, but are bodies like the earth, which revolve in their orbits around the sun and shine with reflected light. The word *planet* means *wanderer*; the name was given these celestial bodies by the ancients, because they were observed constantly to change their positions among the stars. When seen through the telescope, a planet shows a disk, while a star shows only a point of light. Before the invention of the telescope this difference could not be seen; therefore the ancients called the planets *stars*, and the name is still popularly applied to them. We speak of Venus and Jupiter as "morning stars" or "evening stars," without thinking of them as planets.

Size and Distance from the Sun. Named in the order of their distances from the sun, beginning with the nearest, the planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Between the orbits of Mars and Jupiter are hundreds of small planets known as *planetoids*.

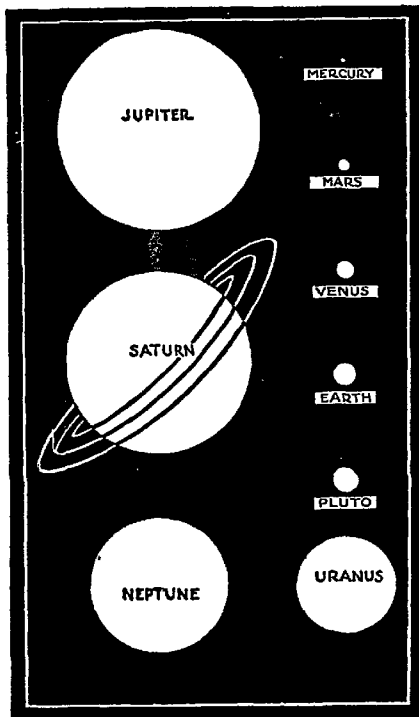
Astronomers divide the planets into two groups; those between the earth and the sun are known as the *inferior planets*, and those outside the earth's orbit as *major planets*. The inferior planets are smaller than the earth, but, with the exception of Mars, the major planets are very much larger. Taking the earth as the standard of comparison, we find some very marked contrasts. Mercury, the smallest planet, is one-eighteenth the size of the earth, while it would take 1,200 earths to equal Jupiter, the largest. Venus is nearly the size of the earth; Mars is about one-seventh as large, Saturn is 770 times larger than the earth; Uranus is 66 times, and Neptune 60 times, larger than the earth.

The distance of the planets from each other increases as their distance from the sun increases. Taking the earth's mean distance from the sun as the unit of measure, the distance of Mercury from the sun is four-tenths that of the earth, that of Venus, seven-tenths, Mars, one and one-half; Jupiter, five and two-tenths, Saturn, nine and one-half; Uranus, nineteen and two-tenths; Neptune, thirty times; Pluto, forty times.

The New Planet. The existence of an unknown planet was conjectured a quarter-century before it was discovered in 1930. But little is yet known about it. We know

its mean distance from the sun is 3,800,000,000 miles, that it requires 247.7 earth years to make one revolution, and that its mass may be five times that of the earth.

Motions. Like the earth, all planets have two motions, a revolution around the sun and rotation upon their axes. The first gives the planet its year; the second, its day. The orbits of the planets are slightly elliptical;



RELATIVE SIZES OF PLANETS

those nearest the sun are the shortest. The movement of those planets nearest the sun is also more rapid than that of those farther away. The year on Venus equals seven and one-half of our months. When we measure the years of the major planets, however, we find them much longer than ours. The year on Mars equals almost two of our years; Jupiter has a year equal to almost twelve of ours; Saturn has one equal to twenty-nine and one-half years; Uranus, one equal to eighty-four years, and Neptune one equal to 164.8 of our years. A centurian on Mercury would be aged only twenty-five of our years,

but a year-old baby on Neptune would have lived longer than any man on the earth since the time of Methuselah.

Another marked contrast between the inferior and major planets is that of density. Mercury, Venus and Mars have about the same density as the earth, but the larger planets are much lighter; while, for instance, it would take 1,200 earths to make a planet equal in size to Jupiter, it would take only 300 earths to make one equal to that planet in weight. A person weighing 100 pounds on the earth would weigh only thirty-eight pounds on Mars, but if transported to Jupiter he would have his weight increased to 30,000 pounds, or fifteen tons.

The following table shows the distances of the planets from the sun compared with the earth's distance, their size compared with the size of the earth, and their periods of revolution around the sun:

PLANETS	DISTANCE FROM SUN	SIZE	PERIOD OF REVOLUTION
Superior Planets			
Mars	1 5	.15	687 days
Jupiter . . .	5 2	1164	11 9 years
Saturn	9 5	783	29 5 years
Uranus	19 2	66	84 years
Neptune	30 0	86	164 8 years
Pluto	40 0	1.25	247 7 years
Earth	1.	1.	365½ days
Inferior Planets:			
Mercury4	.05	88 days
Venus	7	88	224 7 days

Related Articles. Consult the following titles for additional information:

Asteroids	Mercury	Saturn
Astronomy	Nebular	Solar System
Earth	Hypothesis	Star
Jupiter	Neptune	Uranus
Mars	Satellite	Venus

PLANETESIMAL HYPOTHESIS. See GEOLOGY, subhead.

PLANETOID, one of the many small planets revolving around the sun between the orbits of Mars and Jupiter. Over 500 have been discovered, and their number is considered to be countless, but they are so small that they cannot be seen. They are also called *asteroids*.

PLANING MACHINE, a planing tool operated by steam or by electricity. The power wood plane has as its essential parts a drum fitted with cutters which rotate on a horizontal axis. The wood to be planed is made to pass underneath. Another drum cutter may be made to operate beneath the board, and the two sides may thus be planed at one time. Machines for planing metals

have stationary cutters, and the article to be planed is attached to a slab that moves forward and backward across the cutting chisel.

PLANT, the general name given to all members of the vegetable kingdom. Scientists believe that all plants have been developed in a natural way from simple cells. The algae are believed to be the oldest plants, the great parent group from which the liverworts arise directly and from which the fungi have degenerated. From the liverworts were developed the mosses, which it is thought have given rise to the ferns, and they in turn have doubtless developed flowering plants; but just what species of ferns have developed into what species of seed plants is not known positively. Many plants are highly developed and have organs especially adapted to accomplish their purposes. For instance, there are roots, to absorb water and food; stems, to support the plant and carry the sap from root to leaves; leaves, to give off oxygen and carbon dioxide and to absorb such matters as are needed in the manufacture of tissue. There are, however, plants so simple in organization that all these processes are carried on in a single cell.

Plants show as great a variety in their ways of living as in their shapes. Some live independently, while others derive their food wholly or in part from some other plant or some animal. These parasites are not confined to the lower orders of plant life, but are sometimes found as degenerate forms of the highest. Mistletoe and dodder are examples of the latter class. Many species are armed with defensive or protective organs, such as flinty bark, cutting edges, thorns or stinging hairs; others are fitted to capture, hold and digest insects. Harmless plants sometimes mimic the appearance of dangerous species or are colored so as to be almost indistinguishable from the pebbles or earth upon which they live. More surprising still is the storing of poisons or disagreeable matter in a plant, making it unpleasant for animals to eat; or, the growth of means for retaining a bodyguard of ants, which keep plants free from lice and other disturbing insects. The arrangements by which flowers secure cross-fertilization through the agency of insects are among the greatest marvels in nature.

Plants grow by seeds or by roots and root-stocks, and the methods by which the seeds

are scattered are nothing short of marvelous. Some are distributed by means of the wind, the threadlike plumes of the milkweed and dandelion being examples of organs that aid in that way. Some plants break off bodily from the ground and go tumbling over the land. Other fruits are armed with hooks or barbed prickles, by which they attach themselves to wandering animals, and still other fruits are covered by pulpy growths attractive to birds, who aid in the distribution of the hard seeds. The number of seeds produced is in many plants entirely out of proportion to the number that survive. A single orchid has been known to produce 10,000,000 seeds. Some plants have become so highly developed that they are able to adapt themselves to almost all conditions and are known to us as weeds.

Lessons on Plants. *General Suggestions.*

1. Let the lessons conform to the arrangement in your course of study, even though you think you might improve upon that arrangement.

2. Remember that children of the primary and intermediate grades are more interested in studying objects as wholes than they are in studying them by analysis. Do not attempt minute or extended analysis in these grades.

3. Lead the children to do the work under your direction. Ask them to look for that which you wish them to observe and then give them the opportunity to tell what they saw.

4. Remember that through the nature-study lessons you can easily and logically correlate the other branches of study in the course. See that these lessons contribute to the work in language, number, geography and literature.

5. Enter into the work with enthusiasm yourself and the children will become enthusiastic. Study to make your questions and descriptions brief, pointed and plain. Do not use technical terms nor language that the pupils cannot readily understand.

6. Make all preparation for the lesson before calling the class, so that the lesson will begin promptly and continue to the end without interruption.

Selection of Plants. 1. In selecting plants for study in the primary and intermediate grades, bear the following points in mind:

First, the study of plants in these grades should take place in the spring and early summer because the plants which appear and

blossom early in the season are more simple than those reaching maturity later.

Second, other things being equal, plants common to the locality should be selected. It is of great advantage if enough specimens can be secured to provide every pupil in the class with a plant.

Third, select plants large enough to have their parts easily recognized. Young children should not be called upon to observe minute objects.

Fourth, whenever possible, have the pupils collect the plants themselves. With children in the first and second grades this will have to be done under the direct supervision of the teacher or an assistant. Plants should be carefully removed from the soil, so that the roots will remain intact. Before distributing the plants for the lesson, hold the roots under water until all the soil adhering to them is washed off.

Illustrative Lessons. Parts of a Plant. The yellow adder tongue, also known as the dog-tooth violet, is an excellent plant with which to begin this study. The trillium, the hepatica, or liver leaf, the claytonia, or spring beauty, or a violet can also be used. Present the study according to the following plan:

1. Collect and prepare the plants.

2. Call the class and distribute the specimens.

3. Study the plant as a whole.

a. Name. Does anyone know the name of this plant? Possibly some of the children do know its name. If not, give the name.

b. Habitat. Under this head lead the children to tell you what they know about the place in which the plant grows. If they have helped to collect the specimens they can readily tell you in what places it is found. If they do not know where it grows tell them, and if the specimens can be found near the schoolhouse, go with them or have one of the older pupils go with them to find the specimens.

4. Study the parts of the plant. The children will be interested in the large leaves with their beautiful green and brown surfaces and in the single bell-shaped flower at the end of the stem which grows between the leaves. Let the lesson at first follow these lines of interest.

By skilful questioning learn what the pupils have seen.

How many leaves has the plant?
What is their color?

Are they colored alike on both sides?
 What is the shape of the leaves?
 To what are the leaves attached?
 What is on the stalk which grows between the leaves?
 How many flowers does each plant have?
 What is the color of the flower.
 What part of the plant grows under the ground?
 What do we call this part?
 What joins the root to the leaves?

5. Comments. Answers to these questions will lead the children to see that the parts of the plant are root, stem, leaves and flower. The questions above are arranged to follow the children's interest instead of in the logical order that would suggest itself to the mature mind of an adult. By stimulating the child's interest in those parts of the plant which most easily attract attention, the teacher can easily direct his interest to the other parts which she wishes him to observe.

With the first or second grade class the work suggested above will be enough for one lesson, and the time devoted to it should be from ten to fifteen minutes.

Parts of the Flower. With a strong second grade class and with classes in the third grade and beyond, the parts of the flower can be studied with success. The extent of the study should be kept well within the capacity of the pupils, and it is seldom wise to analyze stamens and pistils with classes below the fourth grade.

Call attention to the size of the blossoms on the different plants.

Are they all the same size?
 About how long are they?
 What is their shape
 What is their color?
 How many leaves has each blossom?
 How do these leaves differ from those on the stem of the plant?
 Are all the leaves of the flower alike?
 What color are they?
 What do you see in the flower cup?
 How many of these organs can you find?
 Are they all alike?

One or more flowers from specimens in the teacher's possession should be cut open to display the parts, as illustrated in the cut. If the class is far enough advanced in the work, parts of the stamen and pistil and the pollen can be touched upon in this lesson.

Other Lessons. The foregoing are types of lessons that can be given on other plants. As the work advances the lessons should extend to the study of parts in more detail, as the form, size and structure of the leaves and the way they are joined to the

stem. The stem also should be studied, special attention being called to the difference in appearance of the portion above ground and beneath the surface. Lead the pupils to notice carefully the distinction between the bulb and the roots.

In the fall term these spring plants should again be considered, and a brief study made of the seeds. The plans presented above can be used in the study of any plant or flower. If the structure is complex the study need only be extended to include the new features. However, these complex structures should be approached with care. Teachers occasionally fail in nature study work because they attempt too much, or because they present subjects that are too difficult. It is far better to do a few things well and in so doing establish in the pupils the habit of close and systematic observation than it is to dissipate their energies on so many subjects that they acquire careless habits of study.

Related Articles. Consult the following titles for additional information:

GENERAL

Agriculture	Floriculture
Botany (with list)	Gardening
Breeding	Grafting
Burbank, Luther	Horticulture
Cross Fertilization	Natural Selection

AQUATIC PLANTS

Algae	Cat-tail	Papyrus
Bladderwort	Nelumbo	Water Lily

CARNIVOROUS PLANTS

Butterwort	Sundew
Pitcher Plants	Venus's Flytrap

CREEPING PLANTS

Bindweed	Lysimachia	Virginia
Ground Ivy	Pyxie	Creepers
Ivy	Smilax	Wandering Jew

DESERT PLANTS

Agave	Cereus	Sagebrush
Cactus	Mesquite	Yucca
	Prickly Pears	

DISEASES OF PLANTS

Blight	Ergot	Rusts
Bunt	Mildews	Smuts

DYE PLANTS

Acacia	Indigo	Saffron
Annatto	Logwood	Turmeric
Brazilwood	Madder	Woad
	Safflower	

FIBER PLANTS

Cotton	Hemp	Nettle
Flax	Hibiscus	Sisal

FLOWERS

See Flowers

FORAGE PLANTS

Alfalfa	Clover	Tare
Blue Grass	Gama Grass	Timothy
Buffalo Grass	Millet	Vetch

FRUITS

See Fruits

FUNGOID PLANTS

Agaric	Mushrooms	Truffle
Fungi	Puffball	Yeast
Molds	Slime Molds	

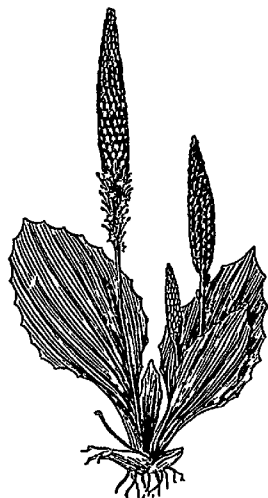
GRAINS

See Grains

See Grasses	GRASSES
See Herbs	HERBS
See Medicine	MEDICINAL PLANTS
Iceland Moss	MOSSES AND LICHENS
Irish Moss	Liverworts
Lichens	Mosses
See Nut	NUTS
Bark	PARTS OF PLANTS
Bud	Bulb
	Leaves
	Pollen
	Roots
	Stems
	PLANT PRODUCTS
Amber	Rosin
Attar	Sago
Balm of Gilead	Cacao
Balsam	Calabash
Coffee	Canada Balsam
Copal	Caper
Cork	Cardamom
Cotton	Chocolate
Lumber	Galls
Resins	Ginseng
	Turpentine
See Spice	SPICES
See Tree	TREES
See Weeds	WEEDS
See Vegetables	VEGETABLES

PLANTAGENET, *plan ta'je net*, a royal house of England, which ruled from 1154 to 1399. The name is said to have been first applied to Geoffrey of Anjou, from his habit of wearing a branch of broom (*planta genesta*) in his cap. The name was borne by fourteen kings, from Henry II, son of Geoffrey, to Richard III. In 1400 the family was divided into the branches of Lancaster and York, and from their union in 1485 sprang the House of Tudor.

PLANTAIN, the name of a family which includes several species of well-known weeds. The common, or greater, plantain, has a rosette of light green leaves, from the center of which long, cylindrical spikes, bearing greenish, inconspicuous flowers, are sent up. This perennial weed is often a pest in lawns and gardens, choking the



GREATER PLANTAIN

growth of all crops. Another species, known as *bracted plantain*, or *rib grass*, is very abundant through the Middle and Western states. It ripens innumerable seeds, and as these are frequently mixed with grass and clover seeds, the plant is widely distributed.

The name *plantain* is given to a tree native to the East Indies and cultivated in almost all tropical countries for its fruits, which resemble those of the banana. These fruits are not so sweet nor so palatable as bananas, but when cooked they are a good dish and constitute the chief article of food in many tropical regions.

PLANT LICE. See APHIDES.

PLASTERING, the art of covering surfaces of masonry or woodwork with mortar, cement, stucco, or plaster, to impart to it a smooth, uniform surface. The wall is generally first covered with laths, or thin strips of wood, having narrow spaces between them. The face of the first coat, which should be of considerable thickness, is troweled, or indented, with cross lines to form a key for the finishing coats. The second coat is applied when the first has thoroughly dried. It is rubbed in with a flat board, so as to fill the indentations thoroughly and to cover the unequal surface of the first coat with a smooth and even one. In plastering walls, great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat. See CEMENTS.

PLASTER OF PARIS, a cement made of gypsum. The gypsum is ground to powder and baked at a high temperature to expel the water. If this dry powder is mixed with double its quantity of water a paste is formed which hardens in about eight minutes. When lime is added to the mixture, a much harder substance is produced. Plaster of Paris is much used in surgery for making casts, and in the arts in making copies of sculpture. It has been widely employed for wall stucco, both for interior and exterior work. It has a certain utility as a fastening for fixtures where nails and bolts cannot be used.

PLATA, RIO DE LA. See RIO DE LA PLATA.

PLATAEA, *plah té'a*, an ancient city of Greece, in Boeotia. Because the Plataeans aided the Athenians at the Battle of Mara-

thon, Xerxes destroyed their town in 480 B. C. It was rebuilt, however, and during the Peloponnesian War it remained such a firm ally of Athens that it was taken by the Spartans. In 373 B. C. it was again destroyed by the Thebans. During the time of Alexander the Great it was rebuilt, but it was never again of much importance.

PLATEAU, *pla to'*, an elevated tract of land with a nearly level surface, formed in a mountainous region by the gradual uplifting of great sections of horizontal strata. The distinction between plateau and plain is one of altitude, the latter rarely being more than a thousand feet above sea level. Plateaus are hundreds and even thousands of square miles in extent, and because of their altitude their streams cut deeper valleys than do those of the plains, often forming deep gorges (see **GRAND CANYON OF THE COLORADO**).

The most noted plateaus of the world are the Rocky Mountain plateau, in the United States; the Andean plateau, in South America, and the plateaus of Tibet and Pamir, in Asia. The latter are the highest and most extensive in the world.

In arid regions, canyons cut the plateaus into tablelands. The high plateaus between mountains are usually rude and barren. Some, because of their altitude, have a climate too cold for successful agriculture. This is true of the plateaus of Tibet and Pamir. Others are robbed of moisture by the surrounding mountains, but occasionally streams flow down the sides of these mountains and form fertile deposits known as alluvial fans. Wherever these occur, they have an appearance similar to that of an oasis in a desert.

Related Articles. Consult the following titles for additional information

Butte	Mountain	Plain
Mesa	Pamir	Tibet

PLATING, *play'ing*, the coating of a base metal with one of the finer metals, especially with gold or silver. Formerly plating was done by soldering upon an ingot of base metal a thin plate of precious metal, usually silver, rolling the metal into sheets and working it into the desired shape. To-day, nearly all plating is done with the aid of electricity. See **ELECTROPLATING**.

PLATINUM, one of the chemical elements, the most valuable metal known. In the latter part of the nineteenth century its money value increased steadily as the demand

grew faster than the supply, today, at current gold prices, platinum and gold are nearly at parity, about \$35 an ounce. Native platinum occurs mostly in small grains, usually containing a little iron, and it is accompanied by iridium, osmium, rhodium, palladium and ruthenium (hence called the "platinum metals") and sometimes by copper, chromium and titanium. It was first obtained in Peru and has since been found in various other localities, including Canada, Oregon, the West Indies, Brazil, Colombia, Borneo and Asia. About eighty-five per cent of the world's supply of platinum ore hitherto has come from the Ural Mountains in Siberia. It was there discovered in beds of gold-bearing sands in 1823, and mining by the Russian government began in 1828. The gold-bearing deposits of California, Oregon and Nevada produce a small quantity, about 600 ounces a year.

Pure platinum is almost as white as silver, takes a brilliant polish and is highly ductile and malleable. It is the heaviest of the ordinary metals and the least expansive when heated. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge, without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state, it has the power of absorbing and condensing large quantities of gases. On account of its power of withstanding heat and the action of chemical reagents, platinum is much used as a material for making such vessels as crucibles and evaporating dishes, to be used in the chemical laboratory. The useful alloys of platinum are not numerous. With silver, it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens when worked. Gold combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. Alloyed with iridium (a rare metal of the same group), and platinum possesses an excellent and unalterable surface for fine engraving. This alloy has also been adopted for the construction of international standards of length and weight. A coating of platinum can be given to copper and other metals by the application of an amalgam of spongy platinum and mercury, the latter be-

ing then driven off by heat. Steel unites with platinum in all proportions. About 46 per cent of the platinum supply is used in jewelry; about 25 per cent in dentistry, in chemistry, 14 per cent

PLA'TO, (427-347 B.C.), a celebrated Athenian philosopher, who has been called the "finest of human intellects," was born of noble family. He descended on his father's side from Codrus, the last king of Athens, and through his mother was connected with the legislator Solon. Aristocles was the name given him, but he was called Plato, either because of his broad shoulders or broad brow. Throughout his early manhood he was a pupil and devoted friend of Socrates; after Socrates' death he traveled abroad ten years, visiting Egypt, Northern Africa and Sicily. At the age of forty he returned to Athens and established a school of philosophy known as the Academy. Here he taught forty years, using the Socratic method of asking questions to provoke discussion and argument. The discussions were the basis of most of his writings, which are all in the form of dialogue.

Believing that the corruption of the world arises from ignorance, Plato based his whole philosophy on two dominant motives—a passion for knowledge, and consequent human improvement, and a persistent belief in the supremacy of mind. Knowledge was not to be sought as an end in itself, nor for self-aggrandizement, but as a guide of life. "Nature and life should be studied as an orderly, connected whole." "Only that is accounted of value which elevates the soul and serves to strengthen, purify and ennoble life." Plato's theory of knowledge embraced the idea that reality does not reside in the transitory individual thing, but in the concept: that is, the general idea of horse, house, dog, which exists in men's minds, is imperishable, while the individual horse, house, dog, which is but a copy of the universal, soon passes away.

In this position Plato is the forerunner of idealism, for he was the first to advance the belief that the world of our ideas is nearer the ultimate reality than the world of sense perception. Through his promulgation of this doctrine, which has many ramifications, he exerted his greatest influence on the thought of the world. According to it the soul becomes our essential being; the body a thing only vaguely known and withal

transitory. This belief leads logically to faith in immortality. Plato believed in one eternal God, and in a previous, as well as a future, existence.

In most of the dialogues of Plato—*Laches*, *Charmides*, *Lyss*, *Protagoras*, *Io*, *Meno*, the *Symposium*, *Phaedrus*—Socrates is the chief speaker. *Euthyphro*, *Apologia*, *Crito* and *Phaedo* treat of the trial and death of Socrates. In his most ambitious work, the *Republic*, Plato outlined what he believed to be the organization of the ideal state. His state is made up of three hereditary classes—the industrial, who provide the material means of living; the military, who guard the lives of citizens; the rulers, especially trained to direct and teach. Only those brought up and trained to the duties of government are capable of exercising its power.

PLATT AMENDMENT. After Cuba was freed as a result of the Spanish-American War, internal strife threatened the existence of the new republic, and the United States was asked to intervene for the restoration and maintenance of order. The Platt Amendment to the Army Bill of 1901 laid down conditions on which the responsibility would be undertaken. The demands, accepted by Cuba, made the island practically an American protectorate, this status continued for a generation. In 1934, by mutual consent, American influence was withdrawn.

PLATTDEUTSCH, *plah't'doich*, or **LOW GERMAN**, the language of the North German Lowlands, which extend from the borders of Holland to those of Poland. It differs from High German, the language of the most cultivated classes and of diplomacy, chiefly in its consonantal sounds and its use of *ik* (the pronoun *I* in English), in place of the High German *ich*. It is more closely related to Dutch and English than is High German. Before the Reformation Low German was the representative language of the German people, but after Luther's translation of the Bible into High German, the latter became the dominant tongue, and to-day it is the language of the government, of the schools, of literature and of all higher learning. See **PHILOLOGY**.

PLATTE, *plat*, the principal river in Nebraska and one of the largest tributaries of the Missouri, formed by the union of two branches—the North and the South Platte, each having its source in the mountains of

Northern Colorado. These branches unite in Lincoln County, and the Platte River flows in a general easterly direction into the Missouri. Because of its shallowness, the Platte is of no importance for navigation.

The North Platte is about 650 miles long, and its drainage basin includes about 20,000 square miles in Wyoming and 7,000 in Nebraska. The South Platte has a drainage basin of 24,000 square miles, included in which are some of the best irrigated areas in Colorado and Nebraska.

PLATTSBURGH, N. Y., the county seat of Clinton County, 167 miles north of Albany, on Lake Champlain, at the mouth of the Saranac River, and on two lines of the Delaware & Hudson railroad. It was settled in 1784 and was incorporated the next year. The village has a picturesque location on Cumberland Bay, which affords a good harbor. In the vicinity are many popular summer resorts. A state normal school is located here, and the municipality has a public library and four other libraries, and two hospitals. Other important structures are a Federal building, a courthouse and jail, homes for friendless and for aged women, a Y. M. C. A., and a new city hall. About a mile to the south is a large national military post, known as Plattsburg Barracks. The Catholic Summer School of America convenes at Cliff Haven, two miles south of the village. Plattsburg has a valuable lumber trade and contains lumber mills, sewing machine and typewriter factories, foundries, machine shops, flour, woolen and pulp mills.

The first "preparedness" military training camp for civilians was located here in 1915, and the innovation became known as the "Plattsburg idea." Population, 1930, 13,349

PLATYPUS. See DUCK-BILLED PLATYPUS.

PLAUTUS, *plaw'tus*, **TITUS MACCIUS** (about 254-184 B. C.), greatest of ancient Roman dramatists and comic poets. The known facts of his life are few. He is said to have been connected with a dramatic company at Rome and then to have unsuccessfully engaged in business. Becoming destitute, he was compelled to earn his livelihood by turning a baker's handmill. While he was thus engaged he wrote three comedies, which were produced at public festivals and which brought him immediate fame. The purity of his language, his genuine humor and his faithful portrayal of middle-and lower-class Roman life made him a great favorite with

the Roman public, and his plays successfully held the stage. He borrowed freely from Greek comedy, but his plays were none the less Roman for that, and admirably delineated Roman life. Twenty of his plays have been preserved, among them *Miles Gloriosus*, in which the cowardice of a would-be hero is amusingly exposed; *Aulularia*; *Bacchides*; *Casina*; *Cistellaria*; and *Amphitruo*, the last—in which the likeness of twin brothers leads to ludicrous mistakes—the source of Shakespeare's *Comedy of Errors*.

PLAY. See GAMES AND PLAYS.

PLEBEIANS, *ple be'anz*, in ancient Rome the lower class, as distinguished from the patricians. They were probably the survivors of an early conquered people who had once had possession of Roman territory, and their ranks may have been added to by captives the Romans brought back from conquered towns. In the early days the plebeians were excluded from nearly every right of citizenship, the entire control of the state being in the hands of the patricians. The civil history of Rome is largely a record of the attempts of the plebeians to establish for themselves a status to which their numbers and economic importance entitled them, and their struggles were crowned with success in the third century B. C. See **ROME, HISTORY OF**.

PLEIADES, *ple'a deez*, the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible without a telescope. They are the central group of the Milky Way. The names of the stars are Electra, Maia, Taygeta, Aleyone, Merope, Celaeno and Sterope, the last the least distinct. Atlas and Pleione are close to the group and the telescope discloses numerous other stars near them.

PLEURA, *plu'rah*, the sac of serous membrane which invests the lungs, separates their lobes from each other, and lines the walls of the chest. The membrane forms a double sac, the inner being called the *pulmonary pleura*, and the outer, the *parietal pleura*. In a healthful condition these sacs move upon each other without friction, because of a lubricating fluid that they secrete. A diseased condition of the pleura gives rise to *pleurisy*. See **PLEURISY**.

PLEURISY, *plu're sy*, a disease arising from the inflammation of the pleura, or the membrane that lines the middle of the chest and covers the lungs. The first symptoms

are usually chills, fever, a sharp pain in the side or chest, and a dry cough. The pain gradually increases until the slightest movement, especially breathing, causes the greatest suffering. In most cases a peculiar liquid passes into the pleural cavity, causing the growth of bacteria, which sometimes set up violent and even fatal complications. Usually, however, the amount of the fluid is so small that it is quickly absorbed. Relief immediately follows, and complete recovery takes place within a few days. The treatment usually consists of rest in bed, hot baths, the application of mustard plasters and strapping the chest to limit the breathing movements. In case of a large accumulation of fluid in the pleural sac the operation of tapping may become necessary.

PLINY THE ELDER (23-79), a Roman writer, whose real name was Gaius Plinius Secundus. He was born in Northern Italy of a wealthy family, and in his youth he went to Rome, where he was educated. Various government assignments took him from place to place, and on his travels he collected a vast fund of information which he preserved as notes. These he afterward used in writing numerous books, only one of which has survived—a *Natural History*—in which are discussions of natural history and science as then conceived. He perished in the eruption of Mount Vesuvius, in 79, and his death is described in two letters of Pliny the Younger, his nephew and adopted son.

PLINY THE YOUNGER (A. D. 62- ?), a nephew of Pliny the Elder, whose full name was GAIUS PLINIUS CECILIUS SECUNDUS. Having lost his father at an early age, he was adopted by his uncle (see above), and he inherited the latter's estates and manuscripts. Talented, well educated and industrious, he was a personality of distinction at the age of twenty. He filled several public offices, and was consul in A. D. 100. In 103 he was appointed propraetor, or governor, of Pontica, and this office he administered satisfactorily for nearly two years. He was regarded by his contemporaries as one of the foremost men of his day. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he attempted both prose and poetry, but of his writings only a collection of letters, in ten books, and a panegyric on Trajan remain.

PLIOCENE, *pli'o seen*, **PERIOD**, the name of that division of geologic time between the

Miocene and Glacial periods. The formations of the Pliocene Period are of great importance in Europe, but they are found only in small areas in the United States, the most important one being near San Francisco. The life of this epoch was similar to that of the present time. Such animals as the llama, the camel, the horse, the mastodon, the rhinoceros and the tiger inhabited North America, and the animals of Europe resembled some of the species now found in Africa. See **GEOLOGY**.

PLOVER, *pluv'ur*, a large family of shore birds found in every part of the globe. They are round-bodied and plump, and are considered good game birds. The bill is like a pigeon's, the wings rather long and pointed, the legs moderately long and bare, the toes three in number. The birds are most frequently seen along the sea coasts at low tide, on the muddy banks of rivers and in marshy tracts about ponds, where their food, consisting of worms and aquatic insects, is abundant. Many are migratory.

The American *golden plover* breeds in the far north and in winter migrates to Central and South America, sometimes going as far south as Patagonia. Other American species are the *ringed plover* of the Arctic regions and about six related species found farther south. These include the *killdeer*, the largest; the *piping plover*, a musical bird of the Atlantic coast, and the *snowy plover*, belonging to the southwestern part of the United States. These birds lay their eggs, three or four in number and ranging in color from cream to olive drab spotted with brown, in shallow depressions in the ground, and the mother bird shows much cleverness in protecting the young. See **KILLDEER**; **LAPWING**.

PLOW. Planting the seed and harvesting the crop are the most important tasks of the husbandman, and most agricultural implements have been invented or improved to lighten the farmer's labors, in planting, tilling and harvesting. One of the most valuable of these implements is the plow, for breaking up the soil and turning it over. Man's first plow was a stick with which he dug up the ground. Later he tamed the ox and the ass and trained them to haul a forked stick to tear up the soil, and from this crude implement the modern plow has been evolved through centuries of study and invention.

The important parts of the modern plow are the moldboard, for turning over the soil;

the beam, to which the other parts are attached and by which the plow is held; the stults, or handles; the knife, or colter, which cuts the turf and roots; the share, which tears up the soil, and the landslide, which runs next to the land not cut by the furrow. Formerly the beam and handles were made of wood, but now all parts of the plow except the handles are made of iron and steel. A small truck is often attached to the forward end of the beam, for the purpose of regulating the depth of the furrow. Plows are manufactured in a great variety of styles, to suit the different purposes for which they are intended. Plows for breaking greensward are larger and stronger than those for plowing tilled land.

Sulky, or *wheel*, plows rest upon two wheels, to which is attached a seat for the driver. The wheel running in the furrow is usually larger than the other. These plows have two or more shares attached to the frame, thus forming a *gang*. They are extensively used in plowing land upon large farms on the prairies.

The largest gang plows turn fifty-four furrows and require three tractors to haul them. One of these gangs will plow an acre in about four minutes. Gang plows are hauled by gasoline or oil tractors.

PLUM, a stone fruit ranking third among orchard fruits in the United States. They are grown in every state of the Union and in Canada, the best yield between 38° to 42° north latitude. The varieties are very numerous, differing in size, form, color and taste. Some are eaten fresh, some are dried and sold as prunes (see **PRUNE**), while others are preserved in sugar, alcohol, syrup or vinegar. Plums also make excellent jams and jellies, and the syrup from stewed plums forms a refreshing drink for invalids. Among the most popular varieties are *green gage*, the *Lombard*, the *Burbank*, and the *damson*. As plum trees are prolific bearers, the fruit is thinned several times a season and prepared for shipping as soon as a good color is attained.

PLUMBA'GO. See **GRAPHITE**.

PLUMBING, the system of pipes, basins, tanks, faucets and other fixtures by which a building is supplied with water, gas, steam heat and drainage. The name is also applied to the art of placing these pipe systems and fixtures in buildings. The name is derived from the Latin word *plumbum*, meaning *lead*,

because originally nearly all pipes for carrying water were made of lead. Now, iron, steel and, in expensive dwellings or public buildings, brass, copper or nickel-plated pipes are used. Water supply and drainage, since they are most closely related to health, require the most careful attention.

Water Supply. In cities and large villages the water supply is usually owned or controlled by the municipality, which lays the main pipes and from these lays service pipes to the boundary of each lot. The householder installs the plumbing in his dwelling and connects his service pipe with that laid by the city. In these modern days all houses have a double system of water pipes, one for cold and the other for hot water. Joints must be tight, and the pipes so placed that they are accessible when repairs are necessary. Iron pipe is generally used.

Sewerage. The health of the inmates depends largely upon the proper drainage of a building. Drain pipes connect with a sewer, and whenever there is a sewer there will be sewer gas. Since this is poisonous, air from sewers and drain pipes must be prevented from getting into the house. The *trap*, usually consisting of a *U*- or *S*-shaped tube, is the most common device for this purpose. Water always stands in the bend of the pipe and seals it against air from the drain. The waste pipe from all sinks, wash bowls, laundry tubs, bath tubs and water closets are provided with traps. Ventilation of the drainage pipes is secured by *soil pipes* which extend from the pipe in the ground through the roof.

Supervision. Plumbing is so closely related to health that nearly all cities require plumbers to take examinations and secure licenses before they can ply their trade. All plumbing must be put in in accordance with city requirements, and city inspectors see that these requirements are met.

PLUMMET, or **PLUMB LINE**, a weight cord suspended in an excavation or in a body of water to ascertain the depth. It is also used by builders as a guide to the perpendicular. In building a high wall masons find a plummet a constant necessity. When used near high mountains the plumb line is attracted toward the mountain mass and slightly deflected from the perpendicular.

PLUSH, a textile fabric resembling velvet, but having a longer and less dense nap. It is made almost exclusively of silk, some-

times with a cotton backing. It is used to some extent for upholstery but chiefly as material for women's hats and dresses.

PLUTARCH, *plu'tahrk* (about 46-about 125), a Greek biographer and essayist, born at Chaeronea, in Boeotia. He traveled in the Mediterranean countries and had access to many libraries and records. His fame rests upon his *Parallel Lives of Illustrious Greeks and Romans*, better known as *Plutarch's Lives*. The "lives" are nearly all written in pairs, one Greek and one Roman, which bear comparison one with the other, and they are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, generally referred to as *Moraha*, embrace essays on philosophical and ethical subjects. His writings show that he was well acquainted with the literature of his time and with history.

PLUTO, in classical mythology, the god of the lower world, the ruler of the dead. He was the son of Saturn and Rhea, and the brother of Jupiter and Neptune. The three brothers deposed Saturn and divided the universe among them, Jupiter becoming ruler of the heavens, Neptune of the sea and Pluto lord over Hades. He was hated and feared by men. With his wife, Proserpina, he inhabited the underground regions, and because out of the ground grew the harvest he became in time honored as the god of agriculture. Since minerals, too, belonged to his domain, he was the god of wealth. As identified with wealth, however, he was called Plutus. He carried a scepter and was accompanied by his dog Cerberus, who guarded the lower regions that none might escape.

PLUTO, in astronomy. See **PLANET**.

PLUTUS, in Greek mythology, the god of riches. Zeus blinded him because he gave wealth to men regardless of their worthiness. By one sculptor he was represented as an infant in the arms of the goddess Fortuna; by another, he is shown with a cornucopia.



PLUTO AND
CERBERUS

PLYMOUTH, *plim'uth*, ENGLAND, a seaport, municipal and Parliamentary borough in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plym and the Tamar. It is well defended, both seaward and landward, by a series of strong forts. The most notable buildings of the city are Saint Andrew's Church; Charles Church, built in honor of Charles I; the guildhall and the municipal buildings. There are numerous charitable and educational institutions. The two harbors of Plymouth gave access to the largest vessels, and the city has a large export and coastwise trade. Tin, lead, copper and granite are exported in large quantities. Shipbuilding and fisheries are the most important industries. The chief importance of Plymouth lies, however, in its position as a naval station. It was from Plymouth that Drake set out on his expedition to sail around the world, and the *Mayflower*, on starting for America, touched at Plymouth, from which she finally set sail in September, 1620. Population of Plymouth proper, 1931, 208,166, of the Three Towns, as Plymouth, Stonehouse and Devonport together are known, 300,000.

PLYMOUTH, Mass., the county seat of Plymouth County, thirty-five miles southeast of Boston, on Plymouth harbor, a part of Massachusetts Bay, and on the New York, New Haven & Hartford railroad. It was here that the Pilgrims settled in 1620 (see **PILGRIMS**). Some of the special features of interest are Plymouth Rock, on which tradition says they first landed; Pilgrim Hall, where books, pictures and other relics of early days are kept, Cole's Hill and Burial Hill, which contain the graves of many settlers, and the large national monument to the Pilgrims, composed of a statue of Faith, surrounded by figures of Morality, Law, Education and Freedom. The town contains Morton Park, a public library and a hospital. The harbor is large, but shallow, and there is some coasting trade. A number of vessels are employed in the fisheries. The town contains manufactures of cordage, woolen and knit goods, nails, tacks, stoves and electrical supplies. The beautiful and historic situation attracts tourists from all parts of the world. Population, 1920, 13,045; in 1930, 13,042.

PLYMOUTH COLONY, a settlement made at the present site of Plymouth, Mass., in 1620, by a party of English Separatists, who twelve years previously had fled to Holland

from England because of religious persecution. Two hundred sailed in the *Mayflower* and the *Speedwell* from Holland. The *Speedwell* was obliged to return, but after a stormy voyage of nine weeks the *Mayflower* passengers disembarked on Plymouth Rock, December 21, 1620. The colonists suffered terribly from starvation, exposure and disease during the following winter and lost some of their foremost men, including John Carver, the first governor. He was succeeded by William Bradford, who for more than thirty years was the leader in the colony. For later history, see MASSACHUSETTS.

PLYMOUTH COMPANY, in American history, a colonization and trading company chartered by James I of England in 1606, for the purpose of planting colonies in America. The London Company (which see) was organized at the same time and for a similar purpose. The Plymouth Company included merchants of Plymouth and Bristol. Their charter allowed them to plant colonies in North America between the Rappahannock River and the eastern point of Maine, but the limits of the territory are not definitely known. An attempt was made to plant a colony on the coast of Maine, in 1607, but the settlement was abandoned the following year. The company had no achievements to its credit, and in 1620 it was superseded by the Council of New England.

PLYMOUTH ROCK, the rock in the harbor at Plymouth, Mass., on which the Pilgrims are said to have first stepped when disembarking from the *Mayflower* in 1620. In 1774, when the rock was raised for perpetuation, it split in twain, an incident which was regarded as significant of the separation of the colonies from England. On July 4, 1834, part of the rock was removed to Pilgrim Hall; now the complete rock rests in its original position protected by a beautiful granite portico, erected by the Colonial Dames in 1921. See PLYMOUTH COLONY.

PNEUMATICS, that branch of physics which treats of the properties of gases at rest and in motion, including a study of the atmosphere. It treats of the weight, density, pressure, equilibrium and elasticity of air, and of its resistance and motion. It also considers air as the medium for conveying sound, heat and light, and treats of the principles and construction of those machines which depend chiefly for their action upon the pressure and elasticity of the air.

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 Pneumatic Tubes

PNEUMATIC TIRES. Pneumatic tires consist of rubber tubes filled with compressed air, and protected by a heavy outer casing of fabric and rubber, and are used on automobiles, motorcycles, bicycles, and on certain types of tractors. About eighty per cent of the world's rubber goes into the manufacture of tires. Automobile tires consist of two parts, an inner soft-rubber tube and an outer hard rubber casing, or shoe. The pneumatic tire is the only successful invention that has been brought forth by man to allow a wheel to move smoothly over all types of roadbeds. Because it has the peculiar property of engulfing irregularities in its path by accommodating the obstacles in a depression of its own surface, the pneumatic tire is unique.

Manufacture. Most of the rubber tires in the United States are produced in factories in the vicinity of Akron, Ohio. Crude rubber from plantations in Malaya, Dutch East Indies, Ceylon, Brazil, and Liberia is first masticated between two huge steel rollers, and the chemical ingredients for making it suitable for tires is added. The next step in casing manufacturing is that of calendering, which consists of impregnating cotton fabric or cord with the rubber by the tremendous pressure of the rolls between which it is run. The black color of the casing is due to the addition of carbon black, which toughens the rubber.

The strips of impregnated cloth are laid on top of each other on a steel drum. The bead which drops into the wheel rim to hold the tire on is next attached. An air bag is then inserted, to shape the casing, and the tire is then placed in a curing mold, which has as its inner circumference the matrix of the non-skid tread of the tire. In the mold the vulcanization of the casing takes place, and the separate fabrics and layers of rubber congeal into a solidified mass. This part of the process takes about one hour. When the top of the mold is lifted, the finished casing is removed, inspected, and wrapped on a special machine which winds a ribbon of paper around the shoe.

The inner tube is usually made of red calendered sheets of rubber, which are wound about mandrels in several thicknesses. The

wrappings are sealed and cured in hot water under pressure. The holes for the valves are then punched and the vulcanization process, similar to that used in the manufacture of the casing, takes place. The result is a seamless piece of rubber tubing that can be inflated inside the casing.

Modern Developments. The pneumatic tire was invented in Belfast in 1888 by John B. Dunlop. The first automobile tires used in the United States were known as the clincher type, in which a flexible steel band held the tire to the wheel. The drop-center rim tire was adopted a few years later, and is widely used today. Until 1924 all tires were of the high-pressure type, but in that year balloon tires were introduced, and these used between 32 to 40 pounds of air, in contrast with the 60 to 80 pounds required by the high pressure type. The trend in air pressures has been steadily downward as the design of the side walls and improvement in materials have paved the way for the low-pressure tire.

Hard rubber tires, introduced in the days before the automobile, were used for many years on horse-drawn trucks. However, because of the excessive wear which they caused to the roadbed, hard rubber tires have been outlawed in many states.

The first successful artificial rubber to be used in the manufacture of automobile tires is DuPrene, a synthetic discovered in 1931. It is a much more satisfactory substance than natural rubber, and can be processed by rubber machinery. It will, however, be some time before its use for automobile tires becomes widespread, because its initial cost is at present much higher than rubber.

PNEUMATIC TOOLS, tools operated by compressed air. Most pneumatic tools are hand tools, and the mechanism for operating them is placed in the handle. They are divided into two classes—those which work as hammers and those which have a rotary motion. To the first class belong the hammer proper, chipping tools, rock drills, riveting machines and caulking machines. The rotary tools include various kinds of boring machines for metal and wood. The tools of the first class are used in metal working and in carving wood and stone. The air is conveyed to the handle by a flexible hose and usually has a pressure of from 80 to 125 pounds to the square inch. The speed and force with which the tool operates are con-

trolled by means of a valve in the handle. In the hands of a skillful operator a riveting hammer is capable of delivering 20,000 blows a minute.

PNEUMATIC TUBES, or PNEUMATIC DISPATCH, a system of sending mail, merchandise and other material through tubes, either above or underground, by means of compressed air. The apparatus consists of a tube or a series of tubes, air-tight cylindrical carrying cases and an air compressor. The cases are forced through the tube by increasing the pressure of the air back of them, or by exhausting the air in front of them, forming a partial vacuum. Pneumatic tubes have been in general use in European countries for carrying mails, telegrams and other small packages for years, but they were not generally employed in America for several years. Now pneumatic dispatch systems are installed between main postoffices and suburban stations or railway stations, and in connection with the telegraph service, in all large cities. Many large retail stores employ the system for carrying cash from the counter to the cashier.

PNEUMONIA, *nu mo'ne a*, an infectious disease of the lungs. Pneumonia is apt to attack people who are in a weakened physical condition. It begins with chills and headache, followed quickly by fever, which lasts usually to the tenth or eleventh day, when a distinct crisis occurs, after which, if it is safely passed, the patient recovers. Death comes from heart failure, due to the poisonous products of the bacteria or from suffocation. It is not possible to cut short the duration of the attack by medical treatment, but much may be done to keep up the patient's strength, to stimulate and support the action of the heart and to reduce the temperature in the fever. In the final stage, too, assistance may be rendered in bringing up the waste matter which is cast off by the lungs. Unlike many of the bacterial diseases, one attack of pneumonia does not render a person immune from another, but it seems rather to leave a tendency to a recurrence of the disease. Physicians have long sought an effective serum to prevent or cure pneumonia in its first stage, but without success.

PO, the largest river of Italy. It rises in Monte Viso, in the Alps, flows eastward 420 miles and into the Adriatic Sea, spreading out at its mouth into a wide delta. It divides the great plain of Lombardy into

two nearly equal parts and receives the waters of the stream flowing south from the Alps and north from a part of the Apennine range, among them the Ticino, the Adda, the Oglio, the Mincio, the Trebbia and the Penaro. The chief cities on its banks are Cremona, Piacenza and Turin. The Po, in spite of embankments, often overflows with disastrous results. The quantities of silt brought down by the river are constantly raising its channel, and the consequent elevating of the embankments has raised them in places to the level of the housetops. The river is navigable in its lower course and is of considerable commercial importance.

POCAHONTAS (1595-1617), daughter of the Indian chief Powhatan, of Virginia. Accompanying her father in his dealings with the English settlers at Jamestown, she became acquainted with Captain John Smith; when the latter was captured by the Indians a popular legend declares she intervened to save him from death. Two years later she is said to have frustrated a plot to destroy Smith and his party. After Smith had left the colony she was kept as a hostage by an English expeditionary force, and during this detention she was baptized and married to John Rolfe, an Englishman, who, in 1616, took her on a visit to England. She left one son, who was educated in London and who afterwards settled in Virginia.

POCATELLO, *po ka tel'o*, IDAHO, the second city in size in the state (Boise being larger), and the county seat of Bannock County, is 170 miles north of Salt Lake City, Utah, on the Port Neuf River and on two divisions of the Oregon Short Line Railroad. Large railroad shops are here, also a packing house, and the city is a distributing point for a large agricultural region made productive by irrigation. There are two hospitals, a Carnegie Library, Idaho Technical College, a Y. M. C. A. and a Federal building. Population, 1920, 14,961; in 1930, 16,471, a gain of 10 per cent.

POE, **EDGAR ALLAN** (1809-1849), an American poet and story writer, born at Boston. On the death of his mother, when he was but two years old, Poe was adopted into the family of John Allan, of Richmond, Va. He was given a good education and was sent, finally, to the University of Virginia, from which, however, he was withdrawn by Mr. Allan, perhaps because of losses at gambling. After serving for two years in the

United States army, Poe was sent to West Point, but was soon dismissed in disgrace. This caused a final rupture with Mr. Allan, and Poe was put upon his own resources. He married, in 1833, his young cousin, Virginia Clemm, and soon afterward he became connected with a magazine in Richmond, to which he contributed tales, poems and literary criticisms. He did not hold this position long, however, nor positions which he secured on other magazines, owing to unsteady habits and intemperance. The long illness of his wife, whom he loved devotedly, and her death in 1847 prostrated Poe, and from this time he drank more and more frequently. In October, 1849, he was found unconscious in a drinking place in Baltimore and was taken to a hospital, where he died.

Poe's fame rests chiefly on his poetry, which is unsurpassed in its musical rhythm and its marvelously effective combinations of sounds. The best known of his poems are *The Raven*, *The Bells*, *Annabel Lee*, *Ulalume* and *To Helen*. The perfect art of his tales, of which *The Fall of the House of Usher*, *Ligeia*, *The Masque of the Red Death* and *The Gold Bug* are typical, gives Poe rank among the masters of short story telling of all time.

POET LAUREATE, *law're ate*, a title conferred by the English Crown upon a poet. The appointment is made by letters of patent, and there is no installation ceremony. While the position of laureate is official, there is only a nominal honorarium (in the case of Tennyson \$500 a year), and there are no specific duties. However, the laureate, in recognition of the honor he has received, has often commemorated in verse important state occasions which have seemed worthy of such notice. Though there had been a number of minstrels and poets attached to the households and medieval English kings, some of them with pensions, the first poet formerly appointed laureate was Ben Jonson. The following lists shows all the poets laureate and the "volunteer laureates" who were their predecessors:



EDGAR ALLAN POE

NAME	BORN	APPOINTED	DIED
Geoffrey Chaucer	1340 [?]		
John Gower	1325 [?]		
John Kay			
Andrew Bernard			
John Skelton	1460 [?]		
Richard Edwards	1523		
Edmund Spenser	1553		
Samuel Daniel	1562		
Ben Jonson	1573	1619	1637
Sir William Davenant	1605	1638	1668
John Dryden	1631	1670	1700
Thomas Shadwell	1640	1688	1692
Nahum Tate	1652	1692	1715
Nicholas Rowe	1673	1715	1718
Rev Lawrence Eusden	1688	1718	1730
Colley Cibber	1671	1730	1757
William Whitehead	1715	1757	1785
Thomas Warton	1728	1785	1790
Henry James Pye	1775	1790	1813
Robert Southey	1774	1813	1843
William Wordsworth	1770	1843	1850
Alfred, Lord Tennyson	1809	1850	1892
Alfred Austin	1835	1896	1913
Robert Bridges	1844	1913	1930
John Masefield	1875	1930	

POETRY, one of the two great classes of literary production, the other being prose. Poetry is rhythmical, imaginative language, appealing to the emotions and the artistic sense. We casually take for granted that prose was the earlier form of literature. Molière in one of his comedies shows the surprise of an old man who discovers that he has been, all his life, "talking prose without knowing it;" but most of us are conscious that we "talk prose," and we see nothing wonderful about it. Prose is so much simpler and more natural than poetry, we think, and surely the early nations must have had a well-developed prose literature before they ventured to attempt poetry.

But when we study just a little way into the subject, we find that such was far from being the case. Centuries and centuries before there was any attempt to produce a prose literature, poetry flourished. And this, when we come to think of it, is natural enough; for just because the daily speech was so commonplace a thing, no effort was made to preserve it. It would have been, moreover, a difficult thing to hand down by word of mouth prose dissertations on any subject. With poetry the case was different. Every nation, it seems, has in its early stages naturally expressed itself in poetry. That does not always mean poetry such as we know so well to-day; it does not mean rhyme and a rhythmic swing which our ears can

recognize as such. But it does, in every case, mean something which had a rhythm to the ears of the people who produced it; something which could be sung or chanted to a musical accompaniment. For invariably, in its earliest stages, poetry belonged with music, and both were the outgrowth of religion. Hymns were sung to the gods, rhythmic accounts of their great deeds were chanted. Gradually, the figurative manner of speech, the musical form without the music, began to be used in writing of other things than religion. Naturally enough—for the step from the gods to the heroes was not a great one with primitive peoples—the deeds of the men of might were celebrated. Thus narrative poetry, the ambitious epic and the simple ballad were among the earliest forms of poetry.

These poems, or songs, were handed down by word of mouth from generation to generation, sometimes through centuries, before they were set down in writing. Thus, when we read an old ballad, such as the "Robin Hood" ballad given in these volumes in the article LANGUAGE AND GRAMMAR, we may feel that we are reading what our ancestors in Great Britain, hundreds of years ago, heard repeated or chanted to the music of the harp, as they sat about their hearth fires.

Related Articles. The different forms of poetry described in these volumes, and various other topics pertaining to the subject, are listed below.

Acrostic	Elegy	Meter
Alliteration	Epic	Minstrel
Ballad	Idyl	Minnesingers
Bard	Lake School	Ode
Blank Verse	Literature	Pastoral Poetry
Didactic Poetry	(with list)	Sonnet
Drama	Lyric Poetry	
Edda	Mastersingers	

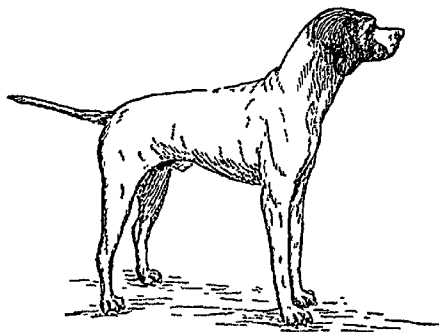
POETS

Addison, Joseph	Dunbar, Paul Laurence
Annunzio, Gabrielle d'	Emerson, Ralph Waldo
Arnold, Edwin, Sir	Field, Eugene
Arnold, Matthew	Fitzgerald, Edward
Austin, Alfred	Fr��chette, Louis
Bradstreet, Anne	H��nric, Goethe
Bridges, Robert	Goethe, Johann Wolfgang von
Browning, Elizabeth Barrett	Goldsmith, Oliver
Browning, Robert	Gray, Thomas
Bryant, William Cullen	Halleck, Fitz-Greene
Burns, Robert	Heine, Heinrich
Byron, George Noel Gordon	Hemans, Felicia Doro-
Camo��s, Luiz de	Herrick, Robert
Carleton, Will	Holmes, Oliver Wendell
Carman, Bliss	Homer
Cary, Alice and Phoebe	Hood, Thomas
Chapman, George	Horace
Chaucer, Geoffrey	Howe, Julia Ward
Coleridge, Samuel Taylor	Hunt, (James Henry) Leigh
Cowper, William	Ingelow, Jean
Dante Alighieri	Juvenal (Decimus Junius Juvenalis)
Drummond, William Henry	Keats, John
Dryden, John	Key, Francis Scott

Kipling, Rudyard
 Langland, William
 Lanier, Sidney
 Le Gallienne, Richard
 Longfellow, Henry
 Wadsworth
 Lowell, James Russell
 Lytton, Edward
 Bulwer
 McCrae, John
 Markham, Edwin
 Martial, (Marcus Valerius Martialis)
 Masefield, John
 Meredith, George
 Miller, Cincinnati
 Heine
 Milton, John
 Moore, Thomas
 Morris, William
 Musset, Alfred de
 Noyes, Alfred
 Omar Khayyám
 Ovid
 Payne, John Howard
 Pindar
 Poe, Edgar Allan
 Pope, Alexander
 Procter, Adelaide Anne
 Read, Thomas
 Buchanan
 Riley, James
 Whitcomb
 Rossetti, Christina
 Georgina
 Rossetti, Gabriel
 Charles Dante
 Ryan, Abram J.
 Sachs, Hans

Sappho
 Saxe, John Godfrey
 Scott, Sir Walter
 Seeger, Alan
 Service, Robert
 Shakespeare, William
 Shelley, Percy Bysshe
 Sidney, Sir Philip
 Simonides
 Smith, Samuel Francis
 Snorri Sturluson
 Southey, Robert
 Spenser, Edmund
 Stanton, Frank L.
 Steadman, Edmund
 Clarence
 Stevenson, Robert
 Louis Balfour
 Swinburne, Algernon
 Charles
 Tagore, Rabindranath
 Tasso, Torquato
 Tegner, Esalas
 Tennyson, Alfred
 Thomson, James
 Timrod, Henry
 Van Dyke, Henry
 Virgil
 Watts, Isaac
 Whitman, Walt
 Whittier, John
 Greenleaf
 Wilcox, Ella Wheeler
 Willis, Nathaniel
 Parker
 Wordsworth, William
 Yeats, William Butler
 Young, Edward

and drooping. The dogs have a very keen sense of smell and are unerring in locating game.



POINTER

POISON, *poi'z'n*, any substance which, introduced into the body, produces dangerous or deadly effects. Many poisons operate chemically, eating or corroding the tissues and causing inflammation and mortification. Examples of these irritants are many metallic oxides and solids, such as arsenic; many preparations of copper, mercury, antimony and other metals; the mineral and vegetable acids, and substances derived from some plants. Other poisons exercise a powerful action upon the nerves and cause the rapid destruction of their energy. These are acids or narcotic poisons, and most of them belong to the vegetable kingdom; alcohol, opium, hemlock, henbane and belladonna are those best known. Some substances, such as illuminating gas or the suffocating vapors from sulphur and charcoal, cause death by making breathing impossible (see ASPHYXIATION). The effect of poisons depends on the extent of the dose, some of the most deadly poisons being useful remedies, if taken under proper conditions and in right quantities. Modern science considers the germs that produce disease as poisons (see GERM THEORY OF DISEASE). Plomaines are poisons obtained from eating spoiled foods (see PTOMAINES).

Treatment. Specific treatment for the most common poisons is given in the article ANTIDOTE (which see), but in treating all cases of poisoning, four things should be borne in mind:

(1) Neutralize the poison as quickly as possible by an antidote.

(2) If the poison has been introduced by the stomach; empty and wash that organ as quickly as possible.

POINCARÉ, *pwan lah ra'*, **RAYMOND** (1860-1934), President of France (1913-1920), four times Premier of the Republic, and throughout his long career a distinguished figure in French politics and administration. He was born in Bar-le-Duc, Lorraine. His leadership of the nation during the war years was especially noteworthy, as was his success, as Premier in 1926, in balancing the budget and stabilizing the franc. He was a member of the French Academy, and was a most effective writer on public affairs.

POINSETTIA, *poin set'i a*, a decorative plant of the spurge family, native to Mexico and Central America. It was introduced into the United States in 1835 by Dr. Pointsett of Charleston, S. C. The plant has a central upright, woody, green stalk, which often grows to be two feet high and which bears, horizontally, lance-shaped leaves, the lower ones green, those at the top bright crimson. A small inconspicuous yellow flower is produced at the tip of the stem. The plants, because of their brilliant coloring, are much in demand as Christmas decoration.

POINTER, a hunting dog, so called because it stops short at the sight of game and points toward it with its nose. It has a smooth coat of short hair, and is marked, usually black and white, like the fox hound. The tail is slender and stiff; the ears, large

(3) Overcome the action of the poison, let it be what it may, by stimulating the life forces in natural ways

(4) Call a physician at once, and follow his directions implicitly.

The stomach may be emptied by means of an emetic, but this should not be used if the poison has a strongly corrosive effect and it is feared that the tissues of the stomach have been injured. The most useful emetics are warm water and mustard, large quantities of warm milk, oils, butter, lard, soapsuds or a weak solution of salt and water. The emetic that is most available and will act most quickly is the one to use. If the poison was an irritant, the alimentary canal should be protected by giving such fluids as flaxseed tea, the white of eggs, milk and barley water. If the poison entered by way of a wound, as in case of a snake bite or dog bite, the first step should be to cleanse the wound. If there are no cuts or sores in the membranes of the mouth, the wound may be safely emptied by sucking it, providing the contents are quickly spit from the mouth and that organ thoroughly washed. A tight bandage should be promptly placed above the wound, which ought to be seared with a heated iron or some other cautery.

POISON GAS, the name applied to a military weapon used extensively in the World War. In April, 1915, during the Battle of Ypres, a vast, greenish-yellow cloud floated toward the allied trenches from the German lines. Canadian and Algerian colonial troops received the brunt of this strange new weapon, which caused the victim to gasp out his life in agony. In such manner did the Germans introduce into modern warfare a device that was destined to play an important part in the great struggle in Europe.

The gas used on the Ypres salient was a chlorine mixture. In preparation for an attack, cylinders weighing about ninety pounds, each containing about forty pounds of the gas liquefied by pressure, were placed under concealment in the front trench opposite the position selected. Lead pipes, bent into position, were attached to the cylinders, and were so adjusted that the openings pointed to the enemy. When wind conditions became favorable the pipe valves were opened and the fumes generated by the gas floated away to demoralize and torture the enemy troops. As the allies were taken wholly by surprise on the Ypres salient, the

first gas offensive caused many casualties. Chlorine sears the lungs, and when it does not kill it usually leaves its victim broken in health.

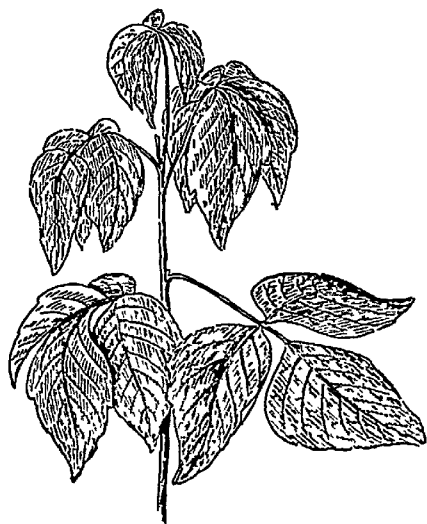
After this innovation the gas shell made its appearance. Into the shell were charged certain liquids and solids, which by the use of T. N. T. or other explosive were converted into fine mist or dust clouds. The minute particles would cling to the clothing and ground and slowly evolve poisonous or irritating vapors. Among other devices used was a "tear shell," which contained a substance causing the eyes to water and producing temporary blindness. A shell containing a sneezing powder was another weapon used effectively, and in the German offensive of March, 1918, the so-called "mustard gas" caused many casualties. The latter was in reality a liquid giving off a heavy vapor which had very serious after-effects.

The allies in self-defense were forced to employ the same weapons, and they retaliated in good measure, using poison gas in huge quantities. As soon as the United States entered the war expert chemists began experimenting, under direction of the Bureau of Mines, and when the armistice was signed they had ready for use the most powerful poison at that time known—a liquid called methyl. This was said to be seventy-two times deadlier than the German mustard gas, and so powerful that a drop on the hand would cause death within a few hours. After the armistice was signed, the stock on hand was put into large iron containers, which were shipped to the seaboard and then dropped into the Atlantic Ocean fifty miles out from land. Another still more powerful gas called Lewisite, from its originator Lewis, was produced too late for America to use in the war.

Both allies and Germans devised some very ingenious masks to protect the soldiers from gas attacks. The typical mask was provided with a canister charged with chemicals which destroyed or neutralized the poisonous substances.

After the war, by agreement of the great powers, the use of poison gas was outlawed for all future conflicts, should there be any (and few statesmen looked for perpetual peace). However, in the Italian invasion of Ethiopia in 1935, Italy resorted to poison gas to help conquer the almost medieval African empire.

POISON IVY, a climbing or training shrub, sometimes erect, with aerial roots and groups of three leaflets, each notched and commonly pointed. This plant is often confused with the Virginia creeper, which



POISON IVY

closely resembles it, but which has five leaflets. The poison ivy spreads rapidly by means of its roots and seeds, and it is a very poisonous weed. It blooms in the heat of summer, having yellow flowers about a quarter of an inch in diameter. In the autumn it becomes brilliantly colored.

POISONOUS PLANTS, those plants which are poisonous to the touch or when taken into the stomach. The name cannot cover a definite class of plants, because some plants that seem poisonous to one person are harmless to another; some plants that are poisonous when growing are harmless when cooked; some plants are eaten by animals and are feared by people. The poisonous juices of many plants make valuable medicine when properly prepared.

In North America there are several plants generally considered poisonous to the touch, among which are poison ivy and poison sumac, both of which to some persons are poisonous and to others are harmless, and the *Virginia creeper*, or five-leafed ivy, which, usually harmless, is noxious to some persons. There are many other plants scattered through different families, from fungi to the

highest types of seed-bearing plants, which, if eaten, cause illness or even death. The mushrooms are probably the most dangerous, because of the resemblance between the poisonous and the edible species. Among the flowering plants which are poisonous are black nightshade, belladonna, henbane, poison hemlock and water hemlock. Among other plants of similar properties to be found in North America are hellebore, pokeweed, digitalis, lobelia and aconite. Nearly all of these are valuable in medicine.

Related Articles. Consult the following titles for additional information:

Aconite	Hemlock	Nightshade
Belladonna	Lobelia	Poison Ivy
Foxglove	Loco Weed	Pokeweed
Hellebore	Mushrooms	Sumac

POITIERS, *pwah tyä'*, FRANCE, capital of the department of Vienne, on a peninsula formed by the junction of the Clain and the Boivre rivers, fifty-eight miles southwest of Tours. Its chief building is its twelfth-century cathedral, in the Gothic-Romanesque style of architecture. Poitiers is one of the oldest towns of France and has the remains of a Roman palace, Roman baths and an aqueduct. Other features of interest include a university and a municipal library of 65,000 volumes. Two famous battles were fought in its vicinity. The first was the battle in which Charles Martel defeated the Saracen army, in 732; the other, that between the French, under John II, and the English, under the Black Prince, in 1356, during the Hundred Years' War. Population, about 42,000.

POKEWEED, a perennial herb which grows to a height from four to six feet, and has widely branching purple stems which bear clusters of small white flowers and after them, purple, juicy berries. The young shoots are sometimes used medicinally; the roots are poisonous. The plant is variously called *garret*, *pigeon berry* and *inkberry*.

POKER, properly called **DRAW POKER**, an insidious gambling game, played with the ordinary deck of fifty-two playing cards, and sometimes with a joker, which is run "wild" and then matches any other card. Five cards constitute a "hand," and value runs from a single pair up through two pairs, three of a kind, straight (five cards in sequence), flush (all cards of the same suit), full-house (three of a kind and a pair, as three 10's and two 4's), four of a kind, straight flush (five in suit sequence), royal flush (ace, king, queen, jack, ten, of one suit).



POLAND, a republic of Central Europe, existing since 1918, a reconstruction of a country of the same name which for centuries was a powerful kingdom with an area more than twice its present size. The old Poland, set in the midst of quarrelling neighbors, fell a prey to their ambitions and was dismembered, its territory being taken by Austria, Prussia, and Russia. This constituted one of the great tragedies of history. The defeat of the Germanic powers in the World War and the ascendancy of the Communist party in Russia made it possible for the Poles to reunite a large part of their historic territory and recreate the Polish state.

In the settling up of the new Polish republic the eminent pianist Jan Paderewski had a prominent place. Throughout the war he had devoted all of his time to helping his suffering countrymen, and in the fall of 1918 he took a leading part in erecting a provisional government which eventually secured allied recognition. In this task he cooperated with General Joseph Pilsudski of the Polish legion. In January, 1919, elections were held to choose delegates to a national assembly to be held at the capital city, Warsaw. On February 10 the newly elected members of the assembly took their seats and began the work of adopting a permanent constitution. In the provisional government Paderewski was Premier and General Pilsudski chief of state, charged with executing the decisions of the assembly.

The new Poland is an inland country, but it was given access to the Baltic Sea by the Treaty of Versailles by taking from Germany a narrow strip of territory stretching northward from Poland's northwest corner, which includes the city of Danzig. This strip is known as the "Danzig Corridor," and it separates East Prussia from the main body of the German fatherland. The Corridor, with Danzig, is officially known as the Free City of Danzig, and is under control of the League of Nations. In order to possess a sea outlet that it could completely control, Poland built a new port northwest of Danzig,

at the fishing village (now city) of Gdynia, which had a population exceeding 30,000 early in 1932.

The Land and the People. For the most part Poland is a plain, gently sloping toward the sea. One-third is forest area, the great estates were largely broken up in 1925, to provide peasant ownership of tracts as small as 145 acres. All crops of the temperature zone are raised; rye is the greatest cereal crop, followed by oats, wheat, and barley. The potato crop averages 30 million tons. In natural riches, Poland has great coal beds, ample petroleum deposits, natural gas, zinc, and vast salt beds.

The area of the country is 149,274 square miles, its population in 1932 was 31,950,000. Warsaw, now called Warszawa, the capital city, has a population of 1,179,000.

History. The Poles, like the Russians, are a Slavonic race, and are first spoken of in history as the Polani, a tribe or people between the Vistula and the Oder. The country was divided into small communities until the reign of Mieczyslaw I (962-992), of the Piast dynasty, who renounced paganism in favor of Christianity, and who was a vassal of the German emperor. He was succeeded by Boleslaw the Brave (992-1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic Knights and Russia. For a time it prospered, on the whole, but an invasion by the Mongols in 1240 and 1241 brought it to a critical condition. Instead of a united kingdom, the country was now but a collection of independent principalities, which were constantly at war with one another. Under Ladislas I (1306-1333) Poland became again a united realm. The last of the Piast dynasty was Casimir the Great (1333-1370), during whose reign the material prosperity of Poland greatly increased.

He was succeeded by his nephew, Louis the Great, king of Hungary, whose daughter, Hedwig, was recognized as queen in 1384. She married Jagello, Prince of Lithuania, and thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. Sigismund I (1506-1548) was one of the greatest kings of the line, and he brought the country to its highest point of prosperity. In 1572 the Jagellon

dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587-1632), Ladislas IV (1632-1648), John Casimir (1648-1669) and the Polish general Sobieski, who became king under the title of John III (see JOHN III SOBIESKI). He was succeeded by Frederick Augustus I, elector of Saxony, who got entangled in the war between Russia and Charles XII and had as a rival in the kingdom Stanislas Leszczynski. Augustus III (1733-1763) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness.

In 1772, under the last feeble king, Stanislas Augustus (1764-1795), the first actual partition of Poland took place. About one-third of her territories were seized by Prussia, Austria and Russia, Prussia receiving the Province of West Prussia, comprising an area of 13,415 square miles; Austria receiving Galicia and Lodomeria, 27,000 square miles, and Russia receiving part of Lithuania, 42,000 square miles. What remained to Poland was completely under Russian influence, despite the earnest struggles of the patriots under Kosciuszko. Another partition in 1793 gave Russia nearly 97,000 square miles and Prussia 22,500 square miles. Again the patriots rose, made Kosciuszko dictator and seemed in a fair way to succeed. Late in 1794, however, Kosciuszko was defeated at Maciejowice by the Russians and Prussians, and in the following year a third partition took place, by which Russia gained 45,000 square miles, Prussia 21,000 square miles and Austria 18,000 square miles. The last Polish king became a pensioner of the Russian court.

The Poles welcomed Napoleon, thinking that he would restore their liberty, and they furnished him a large number of men; but he was able to accomplish little in their behalf, and even the Duchy of Warsaw, which had been established under his suzerainty, lost its independent existence after the disastrous invasion of Russia in 1812. From 1815 to 1830 Russian Poland was a constitutional monarchy, with the emperor as king, but the Poles, seizing the occasion of the French Revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The forces that combined to establish the new Polish state are described early in this article. The

new Constitution of the republic was put into effect in 1920. Marshal Pilsudski died in May, 1935.

Poland has sought political security by an alliance with France, in common with some other small Central European nations who feared strong neighbors. However, this entente was weakened in 1934, when Poland entered into a ten-year agreement with Germany respecting trade, with stress upon a policy of non-aggression during that time.

POLAR EXPLORATION. See NORTH POLAR EXPLORATION; SOUTH POLAR EXPLORATION.

POLARIZATION OF LIGHT, a term applied in optics to certain changes a ray of light undergoes through reflection, refraction, or by passing through certain substances. Since light is produced by vibrations at right angles to the line in which the rays travel, if we could look at the cross-section of a ray of light we should see waves running from



DOUBLE REFRACTION

its center in every direction. A beam is said to be polarized when these vibrations are given a definite direction. The light vibrations have opposite poles, displaying different properties; those on opposite sides of the beam of light are alike, and those at right angles with one another are different. When a ray is passed through a tourmaline crystal the vibrations are given a fixed plane in two directions, at right angles with each other. Place two tourmaline crystals in the path of a ray of light, one in front of the other. Rotate one of them slowly, using the ray as an axis. At two stages in the rotation, 180° apart, the crystal will cast a shadow, showing that the light is obstructed; in a position at right angles with this, the light passes through.

Light is partially polarized by reflection and by refraction. Some substances, such as Iceland spar (calcite), have the property of



Travel Maga

PRESENT-DAY SCENES IN POLAND
 At top, left, a young couple in bridal array; at right, pilgrims at the Church of the Miraculous Virgin, who travel weary miles to be cured of their maladies. At left, below, examining beautiful embroidery of home workmanship; at right, young ladies in afternoon costume.





Travel

POLISH CUSTOMS AND COSTUMES

e, celebration of Corpus Christi Day, observed very generally in all cities and villages. At 17, peasants of the mountain district in richly embroidered jackets and tight, white trousers; right, what little girls wear today in Poland. Their mothers dress in like fashion.



polarizing by double refraction; objects seen through them appear double, as shown in the illustration.

POLE, either extremity of the axis around which the earth revolves. The northern is the *north pole*; the southern, the *south pole*. Each of these poles is 90° distant from any point on the equator. In astronomy, the *celestial pole* is the name given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. The star nearest this point in the northern heavens is the *Pole Star*.

In a wider sense, a pole is a point on the surface of any sphere equally distant from every point of the circumference of a great circle of the sphere, or a point 90° distant from the plane of the great circle, in a line passing perpendicularly through the center called the axis. Thus, the zenith and the nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic.

Pole, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

The *magnetic poles* of the earth are the points at which a magnetic needle varies 90° from a horizontal position, that is, stands vertical. It is not certain that this pole is positively stationary. The most recent observations concerning the north magnetic pole were made in 1906 by Captain Amundsen, who placed it in the neighborhood of latitude 70° north and longitude 100° west. See **MAGNETISM**.

POLECAT, a small animal of the weasel family. The common polecat is found in most

the feet and tail. A superior kind of artists' brush is made from the hairs. The polecat possesses an odor something like that of the American skunk, and hence in the United States the skunk is often called the polecat. It is very destructive to poultry, rabbits, rats and mice, and also feeds on snakes, frogs, fish and eggs.

POLE STAR, or **NORTH STAR**, the brightest star of the constellation Ursa Minor, situated about $1^\circ 20'$ from the north celestial pole, round which it describes a small circle. It is of the second magnitude and is of great use to navigators in the northern hemisphere. Two stars, called the pointers, in the constellation Ursa Major (the Great Bear) always point in the direction of the Pole Star, and are the means by which it may readily be located. See **BEAR**, **GREAT**.

POLE VAULT, a sport wherein the participants leap over a horizontal bar with the aid of a pole, aiming to clear an easily dislodged bar which is supported by two up-rights. The vaulting pole is made of lightweight, tough wood, and is from thirteen to fifteen feet long. The vaulter approaches the crossbar on a run, rests the end of the vaulting pole on the ground about eighteen inches from the bar, lifting himself into the air while thrusting his legs forward with the aid of the pole; he must surmount the bar without dislodging it.

POLICE, in the most common meaning of the term a body of trained men, organized by a municipality to maintain public order, preserve liberty and make life and property of the citizens secure against assault, burglary and other depredations. The organization of the police system varies in different countries. In most of the European countries it is military, and the head of the department is a member of the Cabinet. In England police commissioners are named by the Crown.

American Police Systems. In the United States and Canada the police constitute a department of the city government, and the force is organized under a superintendent, usually appointed by the mayor, or a board of police commissioners. Large cities, like New York, Chicago and Philadelphia, for instance, are divided into districts, which are subdivided into subdistricts and precincts. Inspectors or captains are in charge of the districts and subdistricts, and under them are lieutenants, sergeants and patrolmen, which



POLECAT

parts of Europe, except the extreme south. It is about seventeen inches long, with long, coarse brown fur, which grows blackish on

constitute the body of the force. There are also police surgeons, drivers of patrol wagons and such other assistants as the work of the department may require. Each officer is held responsible for the territory under his charge, and the captains are required to report every morning to the central office.

In the largest cities, besides the patrolmen, there are squads assigned to various duties, such as the sanitary police, who inspect buildings to ascertain their sanitary condition, report nuisances, and seize food unfit for consumption. Mounted police assist the patrolmen in handling the traffic in congested districts.

The detectives devote their time in detecting and arresting criminals and preventing crime. Since they do not usually wear a uniform, in the United States they are known as "plain-clothes men." In recent years women have been added to the police force in the larger American cities, and their work among women and girls is producing excellent results. Were the police force of such cities as London or New York mobilized in one body it would constitute a formidable array. The New York force exceeds 20,000 men, and is maintained at an annual expense of more than \$51,000,000.

A constantly increasing number of states maintain state police forces, whose authority is statewide.

POLITICAL ECONOMY. See ECONOMICS.



POLITICAL PARTIES IN THE UNITED STATES.

Before the Revolutionary War there were practically no political parties in the English colonies. The issues which divided the people centered almost wholly upon the relations of the colonial governments to the mother country. With few exceptions, the colonists favored a larger measure of home rule than Parliament and the king were willing to grant. A few

of the more wealthy colonists favored a stronger government by the king and less by local authorities. After 1760, the strictures on colonial government were more closely drawn, and the colonists who opposed these

strictures took the name *Whigs*, because the Whigs in England favored their cause. Those who favored the steps taken by the home government called themselves *Tories*, after the Tories in England. Soon after the outbreak of the war nearly all the Tories left the country.

The Critical Period. During the progress of the war the Articles of Confederation (which see) were adopted. The operation of these articles soon gave rise to two parties—one composed of those who realized the inadequacy of the Articles of Confederation to hold the states together as a nation, and the other including the opponents of a stronger central government. The disasters following the close of the Revolutionary War soon gave the advocates of a stronger central government a large following, and they gained such strength as to enable them to call a convention for revising the Articles of Confederation. In this convention they were called *Nationalists*, and were strong enough to gain most of their points in forming the Constitution. The irreconcilable differences between the two parties were patched up by a series of compromises.

When the Constitution was placed before the states for adoption it caused a sharp alignment of political parties. The Nationalists who favored the constitution took the name *Federalists*, and their opponents were called *Anti-Federalists*.

The Federalists. Under the leadership of Washington, Hamilton, Jay, John Adams and others, the Constitution was adopted by the necessary number of states, and with the election of Washington, the Federalists came into power and exerted a controlling influence in the organization of the new government. For twelve years this party directed the affairs of the nation. During that time, however, there was a growing feeling, notwithstanding Washington's declarations, that the Federalists aimed to make the government eventually monarchical in form. This, coupled with the sympathy among a large number of people for the advanced democratic ideas finding expression in the French Revolution, together with certain acts passed under the Federalist administration disclosing a distrust of the people, led to the defeat of the party in 1801 and the election of Thomas Jefferson as President. The Federalists continued as the party of opposition until 1814 (see HARTFORD CONVENTION).

The Federalists made a lasting impression upon American institutions. They organized the Senate, the House of Representatives and the Federal Judiciary on plans that have continued to the present day, and they established foreign and domestic policies that have been followed by all administrations since the days of Washington.

The Republican Party of 1801. For twenty-five years the Anti-Federalists, under various names, held control of the government. Among their most illustrious leaders were Jefferson, Patrick Henry and George Clinton. Before his election, Jefferson had united his followers under the name *Republicans*, and after his election this name was applied to all factions which had united in opposition to the Federalists. The name was later changed to *Democratic-Republican* and finally to *Democratic*, and under this name the Democratic Party of which Jefferson was the founder has existed to the present time.

During this period, however, a change occurred in the general policy of the party. Whereas it had come into power as the party of the strict construction of the Constitution, circumstances compelled it to disregard its old principles at times and to interpret the Constitution more liberally than the Federalists ever had done, as in the expansion of territory by the Louisiana Purchase and in the Embargo and Non-Intercourse acts.

The Democratic Party. From the election of Jefferson in 1801, the Democratic Party won every Presidential election, except three, to 1860. These three exceptions were the election of John Quincy Adams by the National-Republicans in 1824, the election of William Henry Harrison by the Whigs in 1840, and the election of Zachary Taylor by the same party in 1848.

Though Monroe's administration is known as the "Era of Good Feeling," in reality party dissension continued throughout this period, and in fact became so bitter over the questions of tariff, internal improvements and the interpretation of the Constitution, that a large faction of the old party broke away from its allegiance and formed a new party, known as the National Republican, led by John Quincy Adams and Henry Clay. Many of the old Federalists supported the new party, and its candidate, Adams, was elected in 1824 over Andrew Jackson, the Democratic-Republican candidate. However, the growing demand for a "people's President,"

which was expressed in the popular candidacy of Jackson, grew to such proportions that the National Republicans were swept out of office, and Jackson was chosen President in 1828.

In 1832 all parties for the first time nominated their candidates for President at national conventions. Jackson was reelected, but during his second administration the hold of the Democrats on the government was decidedly weakened through his open opposition to the United States bank, which had become an important part of the fiscal system of the country. However, in 1836, the Democratic candidate, Martin Van Buren of New York, was chosen President. Throughout Van Buren's administration the influence of the Democrats was constantly weakened, Congress was almost evenly divided between Whigs and Democrats, and the administration was constantly harassed by its inability to secure the passage of its measures.

The Democratic party had generally been united on national issues, but in 1820 it began to divide on the issue of slavery, the line being sharply drawn at the passage of the Missouri Compromise (which see). The issue became more and more prominent at each succeeding election, until the final break in 1860. The union of many Southern Democrats with the Whigs in 1840 carried the election in favor of General Harrison. But in 1844 the Democrats were successful, the chief issue of the election being the annexation of Texas. This was not accomplished, however, until after the Mexican War, which tended still further to divide both the leading parties along sectional lines. In 1848 Zachary Taylor, the Whig candidate, was chosen over Lewis Cass, the Democratic nominee. Before this election the party in New York had divided into two wings known respectively as the *Barnburners* and the *Hunkers*. The former united with the *Free-Soil* party and in so doing gave the electoral vote of New York to General Taylor, which secured his election. The controversy over slavery increased in bitterness with each succeeding Congress. President Taylor died in 1850 and was succeeded by Millard Fillmore, who was anti-slavery in his sentiments. During his administration the slavery question recurred in various forms, relating to the admission of new states, the power of Congress to restrict slavery in the territories, and the obligation of free states to return fugitive slaves to their owners. The most

important event of the period was doubtless the passage of the Compromise of 1850 and the Fugitive Slave Law, which seemed for a time to set the slavery question aside.

During Pierce's administration (1853-1857) the Kansas-Nebraska Bill (which see) caused a realignment of both parties. The Southern Democrats and Southern Whigs united in support of the measure, which practically took from Congress the power to regulate slavery in the territories. While the Northern Democrats were evenly divided concerning it, the Northern Whigs and Free-Soilers were united against it. The Democratic party reunited after this contest, but the Whigs were permanently divided, and soon after, the name disappeared from politics.

Although the Democrats were successful in the elections of 1852 and 1856 the breach between the North and the South continued to widen, and in the Presidential campaign of 1860 the party divided into two factions. The Dred Scott Decision, which practically opened all United States territory to slavery, aroused the North to the perils that might arise unless the slave power was checked. The wing of the party opposed to the extension of slavery nominated Stephen A. Douglas, and the Southern wing nominated John C. Breckinridge. There was also a *Constitutional Union* party in the field, with John Bell, of Tennessee, as their candidate. The division in the Democratic party resulted in the election of the Republican candidate, Abraham Lincoln.

Soon after the election of Lincoln several of the Southern states seceded and the Civil War (which see) followed. Although the Northern Democrats stood by the government during the Civil War, the party lost influence, and for a time had only a small minority in Congress. They contested every national election with the Republicans, but did not return to power until 1884, with the election of Grover Cleveland. Cleveland was defeated in 1888, but elected again in 1892. The financial depression that occurred during Cleveland's second administration caused general dissatisfaction. In the campaign of 1896, the Democrats nominated William Jennings Bryan of Nebraska, and went before the country advocating the free coinage of silver at the ratio with gold of sixteen to one. Several other parties were in the field, but the main issue was between the Democrats and

Republicans. The Republican candidate, William McKinley, was elected. The tariff (which see) and other financial measures constituted the leading points of controversy at this and several other elections.

The Democrats did not return to power until 1912. As the result of the preferential primaries, the national Democratic convention of that year had two prominent candidates before it; these were Champ Clark of Missouri, who represented the conservative element in the party, and Woodrow Wilson of New Jersey, who represented the progressive element. After a long contest the progressive element won and Wilson was nominated. A division in the Republican party gave the Democrats an easy victory. At his inauguration President Wilson had a good working majority in both branches of Congress. During his first administration the Federal Reserve Bank law was enacted, and the tariff was revised in accordance with the Democratic policy of revision downward. Free trade, or a low tariff, is a cardinal principle of the modern Democratic party.

History shaped itself in an entirely unforeseen manner during the Wilson administration. The outbreak of the war in Europe in 1914 set in train a series of events that vitally affected American policies, both domestic and foreign. After keeping the country neutral until 1917, President Wilson broke off diplomatic relations with Germany when the latter country attempted to define and restrict American rights on the sea, and in April the United States entered the conflict as a belligerent.

The period of American participation in the war saw an extraordinary development of central authority. The administration, impelled by the necessity of creating a great war machine, assumed vast powers. The railroads and telephone and telegraph lines were placed under government control, all food dealers were forced to operate under licenses, and commodities, raw materials, factories and other sinews of war were commandeered. The people accepted these and like measures as necessary for the winning of the war; as a matter of fact, the United States was experimenting with state socialism and paternalism.

Again, in 1933, the Democratic party came into power, following a period of economic depression. Again, under President Franklin D. Roosevelt, the administration sought and

obtained from Congress grant of large powers, with which to combat the evils of unemployment, depreciation of values and general stagnation of industry. Departing from early Democratic theories, the Roosevelt administration adopted many measures which tended to centralize control and regulation in the Federal Government

The Republican Party. The Republican party, organized at Jackson, Mich., in 1854, was the outgrowth of opposition to slavery. It was formed by the fusion of anti-slavery parties and factions, among them the Liberty Party, the Free Soil Party, Know Nothings, anti-slavery Whigs, anti-slavery Democrats and Abolitionists. The Republicans held their first national convention in 1856, and nominated John C. Fremont for President. Among their most prominent leaders were Abraham Lincoln, William H. Seward, Horace Greeley, Salmon P. Chase, Hannibal Hamlin and William Cullen Bryant, besides scores of others prominent in political life. Within two years the party secured a popular majority against slavery in fifteen states and elected eleven United States Senators. At the election in 1856 Fremont secured 114 electoral votes. By 1859 the party had gained a majority in the House of Representatives. At the election of 1860 it came into power with the election of Abraham Lincoln, and for fifty years, with the exception of the election of 1884 and of 1892, it managed the affairs of the nation.

The Republican party was at once confronted by the issues of the Civil War, but during the struggle the government was supported by most of the Democrats of the North. Before the election of 1864, enough of the "War Democrats" had become estranged to form a serious opposition. The Democrats nominated George B. McClellan, a popular general, and made their campaign on the assertion that the war was a failure. The Republicans nominated Lincoln, who was re-elected. On April 14, 1865, just as the war was coming to a close, President Lincoln was assassinated. Andrew Johnson, of Tennessee, a War Democrat, became President, and during the next four years all parties suffered the severest strain. Johnson immediately disclosed his disapproval of the reconstruction policy of Congress and, as a result of his fierce and tactless opposition, he was impeached, being saved from conviction by only one vote. However, the Democrats,

who had approved his course, refused to support him in 1868, nominating Horatio Seymour, of New York, against a popular Republican candidate, General U. S. Grant.

Grant gained an overwhelming victory and furthered the Republican policy as outlined by Congress. During his two administrations, however, the opposition to the radical reconstruction policy gained strength and found expression in the *Liberal Republican* party, which, at its convention in May, 1872, nominated Horace Greeley, of New York, a former Republican. Grant was renominated by the Republican party, and, though the majority of the Democrats endorsed the Liberal Republican nomination, a few refused to follow and nominated Charles O'Connor. Grant received an overwhelming majority. During the second administration of President Grant, charges of corruption, involving many high officials, led to a serious rupture in the Republican ranks, and in 1876 the Democratic candidate, Samuel J. Tilden, gained a majority of the popular vote, though his Republican opponent, Rutherford B. Hayes, was chosen by an electoral commission, to whom were referred the returns from a number of disputed states.

Reconstruction was completed under Hayes, and the corruption which had been disclosed under his predecessor was so vigorously dealt with that the Republicans made decided gains in popular esteem. Their candidate, James A. Garfield, was elected in 1880 by a small plurality over Hancock, the Democratic nominee, and James B. Weaver, the Greenback candidate. Garfield was assassinated early in the following year and was succeeded by Chester A. Arthur. During his administration the tariff controversy, which had been constantly assuming greater importance since the Civil War, became the paramount issue, and the Democratic candidate, Grover Cleveland, was elected in 1884, over James G. Blaine, Republican. The houses of Congress were controlled by opposite parties during this administration, and but little was accomplished.

In 1888 Cleveland was succeeded by Benjamin Harrison and the Republicans again returned to power. The McKinley tariff which was passed in 1890, and the Sherman silver law of the same year, proved unpopular, and as a result of a wide-spread educational campaign on the part of the Democrats, Cleveland was reelected in 1892.

The issue between the free coinage of silver on the ratio of sixteen to one and the gold standard of coinage, combined with the general dissatisfaction over industrial conditions, gave the election to the Republicans in 1896, and William McKinley, author of the McKinley Bill, was seated in the Presidential chair. The Spanish-American War (which see) was the leading event of McKinley's administration, and may be considered epoch-making, since it radically changed the foreign policy of the government. McKinley was reelected in 1900, but was assassinated in 1901, and was succeeded by Theodore Roosevelt, who by general election in 1904 was continued as President until 1909.

Wilham Howard Taft defeated Bryan in 1908 and held office for four years. He was renominated by the Republicans in 1912, but the progressive Republicans formed a new Progressive Party and nominated Roosevelt. Both parties met defeat, and the Democrats came into power with the election of Woodrow Wilson.

The Republican party came into power with the election of Warren G. Harding in 1920. He died in August, 1923, and was succeeded by the Vice President, Calvin Coolidge, who was reelected in 1924 for the next full term. Herbert Hoover was President from 1929 to 1933, and was defeated for reelection, following a period of business depression.

Other Parties. Since the adoption of the Constitution there have been two dominant political parties in the country, and one or the other has been in constant control of the government. From time to time, however, other parties have arisen and brought before the country issues not included in the platforms of the dominant parties. The most important of these are the following:

National Republican Party. This party was really a wing of the Democratic-Republican party. The party favored internal improvements, and a protective tariff. They elected John Quincy Adams in 1824, and nominated Henry Clay in 1831, but were defeated by the Democrats.

American Party, also called Know-Nothings. This party originated in New York and Philadelphia in 1835. Its main doctrine was opposition to the influence of foreigners in the government. The party attained its greatest prominence in 1852. The members were bound by a secret oath, and nominations were made in secret. From their declarations of ignorance as to the existence of the party and its

proceedings, the members were given the name Know-Nothings, and this name was finally applied to the party. In the election of 1854 they carried most of the New England states, New York, Maryland, Kentucky and California, and polled a large vote in the South, but their influence rapidly declined, and many of the members joined the Republicans.

Whig Party. The Whig party was organized in 1834 by a coalition of the National-Republicans, the Anti-Masons and the Democrats who opposed Jackson's policies. Their most distinguished leaders were Daniel Webster and Henry Clay. At the time of their organization the Whigs favored a liberal construction of the Constitution, a protective tariff and a United States Bank. They were defeated in 1836, but in 1840 they elected General Harrison by a large majority. Harrison died soon after his inauguration, and his successor, Tyler, was unable to carry out the policies of the party. The party divided into Northern and Southern factions over the Mexican War, and was defeated in 1844. In 1848 the Whigs elected General Zachary Taylor, but again they were disappointed by the death of the President early in his term. The party became divided on the question of slavery, and was defeated in the Congressional elections of 1852. After this, most of those in the North joined the Republicans, while those in the South joined the Democrats.

Liberty Party. The Liberty party was organized to oppose slavery and was in existence from 1839 to 1848. It held three national conventions, but had no effect upon the results of national elections. It was merged with the Free-Soil party, and both joined the Republican party. William Lloyd Garrison was their most noted leader. John G. Whittier and Wendell Phillips were prominent members of these anti-slavery organizations.

The Constitutional Union Party. This party was founded in 1860 by the Southern Whigs, who would not unite with the Republicans or either wing of the Democratic party. Their platform was "The Constitution, the union of the states and the enforcement of the laws." They carried Kentucky, Tennessee and Virginia, but were destroyed by the Civil War.

Prohibition Party. This party was organized in 1869, and is still in existence. It has a peculiar record. Although it has never secured an electoral vote, it has seen the goal of its endeavor, namely national prohibition of the liquor traffic, accomplished by the ratification of the XVIIIth Amendment to the Constitution in 1919. Previous to the introduction of this amendment into the United States Senate, state after state had passed prohibition laws, and while the passage of these laws cannot be traced directly to the Prohibitionists, without doubt the influence of their vigorous denunciation of the liquor traffic was far-reaching in securing this legislation.

Greenback Party. The Greenback party was organized in 1874 by those opposed to the return to specie payments (which see). They

advocated the withdrawal of all national bank currency, the substitution of a currency issued by the government, and the use of coin for the payment of interest on the national debt only. The party secured no electoral votes and exerted no influence

Populist Party or People's Party. This party, organized in 1891, was the outgrowth of the Grange and Farmers' Alliance movements, and its members were drawn chiefly from industrial classes. The platform demanded free and unlimited coinage of silver, national ownership of all public means of transportation and communication, the abolition of the national banking system, a graduated income tax and the election of United States Senators by the people. In 1892 their candidate for President received twenty-two electoral votes, and they elected a number of Congressmen. But before the next election much of their platform had been incorporated into the platforms of the Democratic and Republican parties, and their influence began to wane

Socialist Party. The present Socialist party was formed in 1897 under the leadership of Eugene V. Debs (which see). It was the outgrowth of several other organizations, all having for their purpose the securing of better conditions for working men. Their platform was similar to that of the Populist party, but went further. They advocated equal suffrage for men and women, the establishment of the initiative, referendum and recall and the election of judges by the people. They have been successful in a number of local elections. In 1910 they carried the city of Milwaukee. Norman Thomas, Socialist candidate for President, received 267,835 votes in 1928, and 881,951 in 1932.

Progressive Party. The Progressive party was formed as result of a division in the ranks of the Republican party in 1912. Previous to the national convention of that year, there was a division in the party over the tariff and other issues. Many of the younger members of the party demanded a radical change in the management of its affairs. This demand was strenuously opposed by the older members, who were called standpatters, the other faction being known as insurgents. Some delegations to the national convention in 1912 were chosen at the primary elections and some by the old method of State conventions. As a result a number of states sent two delegations to the convention, and contests developed. The organization of the convention was in the hands of the standpatters, and in all contests they seated the delegation chosen by the old method. The defeated delegations, under the leadership of Theodore Roosevelt, organized the Progressive party, nominated Roosevelt for President, and Governor Johnson of California for Vice-President. The conservative wing renominated Taft. This split in the Republican ranks enabled the Democrats to win the election.

Communist Party. In the United States a party, 108,000 strong, whose tenets embrace the communist principles of Soviet Russia. See COMMUNISM



Tomb in Nashville

POLK, *poke*, JAMES KNOX (1795-1849), an American statesman, eleventh President of the United States. He served but one term in office, but in his administration there were notable additions of territory to the country, and a foundation was laid for the marvelous development of the Far West. In this administration, too, the United States fought, in a brief conflict with

Mexico, its first foreign war since the War of 1812

Early Life. James K. Polk was born in Mecklenburg County, North Carolina, November 2, 1795. His father, a prosperous farmer, removed to Maury County, Tennessee, when James was eleven, and there the boy was given the best schooling available. Prepared for college by a private tutor, he entered the sophomore class of the University of North Carolina at the age of twenty, and was graduated with honors three years later. After a course in law he was admitted to the bar and began to practice in Columbia, the county seat of Maury County.

Early Political Career. The young lawyer had gratifying success from the start, and was soon a power in local Democratic politics, winning election to the state house of representatives in 1823 and a seat in Congress in 1825. In the National House he served as Speaker for the period of 1835-1839. In 1839 Polk was elected governor of Tennessee, but was defeated in 1841 and in 1843 for reelection. His viewpoint on national issues he stated in his first inaugural address. He was opposed to a high tariff and to Federal taxes, and he deplored the Abolitionist movement as undermining the unity of the nation. At the same time, he was in no sense a proslavery man.

Presidential Candidate. In 1844 Polk received the Democratic nomination for President. He was a compromise candidate, but was generally respected for his high character and ability. There were two paramount issues before the people—the annexation of Texas and the settlement of the Oregon boundary. Spanish possession of Texas had been conceded by the United States in 1819, though there had been at attempt to include

Administration of James Knox Polk, 1845-1849

I. THE PRESIDENT

- (1) Birth
- (2) Education
- (3) Political career
- (4) Character
- (5) Death

II. FOREIGN RELATIONS

- (1) The "reoccupation" of Oregon
 - (a) Fifty-four forty or fight
 - (1) President claimed Oregon
 - (a) By right of discovery
 - (b) Treaty
 - (c) Settlement
 - (2) England claimed it on the same grounds
 - (b) Treaty of 1846
 - (1) By Pakenham and Buchanan
 - (2) Settled boundary at 49°
 - (3) Reserved Vancouver Island and allowed navigation of the Columbia to Great Britain
- (2) The "reannexation" of Texas
 - (a) Arguments for annexation
 - (1) Congress has power to admit new states
 - (2) Prevent England from securing domination
 - (3) The election interpreted as a demand for annexation
 - (b) Arguments against annexation
 - (1) Annexation by joint resolution unconstitutional
 - (2) Annexation by treaty unconstitutional
 - (3) Election of Polk should not be interpreted as settling the question
 - (4) Annexation of Texas meant war with Mexico
 - (5) It would increase slave

area

- (c) Texas accepts annexation
- (3) The Mexican War
 - (a) Causes
 - (1) Annexation of Texas
 - (2) Boundary dispute
 - (3) Expansion of the country to natural boundaries
 - (b) Events
 - (c) Treaty of Guadalupe Hidalgo
 - (1) Rio Grande fixed as the boundary
 - (2) United States paid Mexico \$15,000,000
 - (3) United States to settle American claims against Mexico
 - (4) New Mexico and upper California ceded to the United States

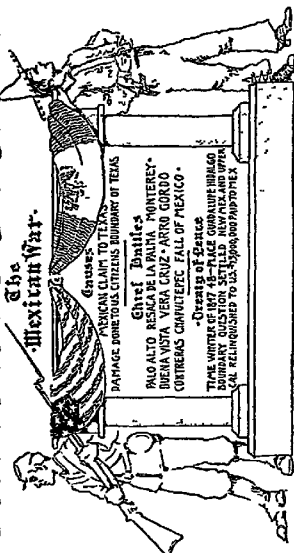
III. DOMESTIC AFFAIRS

- (1) Tariff of 1846
- (2) Independent Treasury
- (3) Wilmot Proviso
- (4) New states and territory
 - (a) Iowa and Wisconsin admitted
 - (b) Oregon organized as a territory, 1848
 - (c) California organizes its own government
- (5) Discoveries and inventions
 - (a) Ether used as an anesthetic
 - (b) Sewing machine
 - (c) Cylinder printing press

Questions on Polk

Of what state was Polk a native?
 What was meant by the phrase "fifty-four forty or fight"?
 What part of the United States now has its boundary on this parallel?
 By what right did the United States claim Oregon?
 Name at least three arguments in favor of the annexation of Texas.
 What were some of the arguments against annexation?

1845-1849 Polks Administration



The Mexican War.

ARMY OF THE UNITED STATES

GENERAL BARRAGAN

GENERAL BARRAGAN

GENERAL BARRAGAN

GENERAL BARRAGAN

GENERAL BARRAGAN

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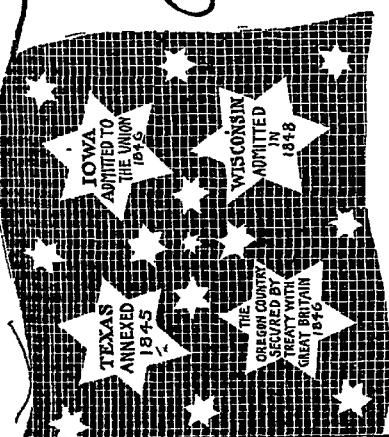
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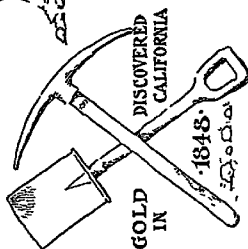


IOWA
ADMITTED TO
THE UNION
1845

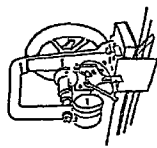
TEXAS
ANNEXED
1845

WISCONSIN
ADMITTED
IN
1848

THE
OREGON COUNTRY
SECURED BY
TREATY WITH
GREAT BRITAIN
1846



DISCOVERED
CALIFORNIA
GOLD
IN
1848



SEWING MACHINE
INVENTED BY HOWE 1845

HAPPENINGS

NAVAL SCHOOL FOUNDED AT ANNAPOLIS-1845-
SYTHASIONIAN INSTITUTE ESTABLISHED-1846-
1ST OPERATION PERFORMED BY USE OF ETHER-1846-
HOE CYLINDER PRINTING PRESS INVENTED-1847-
SALT LAKE CITY FOUNDED-1849-

it in the Louisiana territory. In 1821, when Mexico secured its independence from Spain, Texas became a Mexican province. Then followed a great influx of American settlers, the establishment of a Texas republic and the agitation for its annexation to the United States. Polk declared for the immediate "reannexation" of Texas, for he believed that the region had once been a part of the United States. In regard to the Oregon boundary, which was a bone of contention between Great Britain and America, Polk took his stand on the "reoccupation" of Oregon. The United States claimed territory as far north as parallel $54^{\circ} 40'$, and the Democrats adopted as a campaign slogan the phrase **JAMES KNOX POLK** "fifty-four forty or fight." The Whigs nominated Henry Clay; the antislavery men, James G. Birney. Polk won by 175 electoral votes, Clay receiving 105.



His Administration. The first notable event of Polk's administration was the admission of Texas as a state, on December 29, 1845. Disputes between Texas and Mexico on the question of the boundary line led to hostilities (for full details, see **MEXICAN WAR**), and in May, 1846, Congress voted money for the prosecution of war with Mexico. The American forces won a series of victories culminating in the capture of Mexico City in September, 1847, but the peace treaty was not signed until February, 1848. By its defeat Mexico was forced to cede to the United States over 525,000 square miles of territory. This acquisition served to make the slavery controversy more acute, as it opened the way to a vast extension of slave territory. The Wilmot Proviso, providing for the exclusion of slavery from states to be carved out of territory acquired from Mexico, was presented in Congress in August, 1846. It passed the House, but failed in the Senate.

President Polk was content to have the Oregon question settled peaceably. Though elected on a "fifty-four-forty" platform, he did not oppose the acceptance of the compromise whereby the 49th parallel was made the boundary line. The negotiations to this end were completed in 1846. The same year

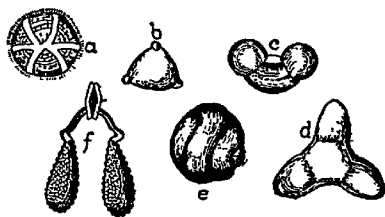
Congress passed the Walker Tariff Bill, providing a tariff for revenue only, and an act reestablishing the independent treasury system. Two Congressional appropriations for national construction work were vetoed by the President, who was decidedly opposed to the use of Federal funds for internal improvements which benefited only certain sections.

Other notable events of the administration included the admission of Iowa (1846) and Wisconsin (1848) as states, the organization of Oregon as a territory, the discovery of gold in California, the founding of Salt Lake City and the establishment of two important institutions—the Naval Academy at Annapolis, and the Smithsonian Institution at Washington. There was noteworthy progress in science and invention; Elias Howe received his sewing machine patent in 1846, and the following year the Hoe rotary printing press was invented. In 1846 ether was first used as an anesthetic in surgery.

Polk was not a candidate to succeed himself, and the election of 1848 was won by the Whig candidate, Zachary Taylor, the hero of the Mexican War. Polk died a few months after his retirement from office.

Related Articles.	Consult the following
titles for additional information	
Guadalupe Hidalgo,	Smithsonian Institution
Treaty of	tion
Mexico (history)	Texas (history)
Naval Academy	Wilmot Proviso
Oregon (history)	

POLLEN, the yellow dust formed on the anther of a flower, which when transferred to the stigma of the same flower, or another of the same species, fertilizes the ovules and causes seed to be produced. This dust is com-



POLLEN, ENLARGED

a, gourd, b, enchanter's nightshade, c, pine; d, evening primrose, e, musk plant, f, milkweed.

posed of minute cells, which, under the microscope, are seen to vary with species in shape and size. When one of these cells or grains falls upon the stigma, a fine tube protrudes from the sticky interior of the cell and penetrates the style to the ovule. The ovule then

divides and develops an embryo, which ripens into a seed. This transference of pollen is called *pollination*.

Most plants are cross-fertilized; that is, reproduction depends upon the transference of pollen from one flower to another. In such case the pollen is carried by insects, birds, wind or other agencies. Plants that require to be cross-fertilized usually have brightly-colored flowers or sweet-scented blossoms containing nectar, to attract the insect. Bees are the chief agency in plant pollination; and nature, in providing this means of propagation, has made the bee so discriminating that it never mixes honey, but gathers a load of nectar from only one sort of flower, and so carries the golden pollen cells, which often are sprinkled over it like dust, where they are needed. When a flower contains both elements necessary for fertilization, the plant is said to be self-pollinated. See **CROSS FERTILIZATION**.

POLL TAX, a tax levied by the head. *Poll* is the old English word meaning head. Most taxes are levied on property or income; the poll tax, on the contrary, is one levied upon each person in a state regardless of his financial worth. The Congress of the United States has never levied a poll tax, but in most states of the Union there is such a tax, varying from fifty cents to three dollars. In some states a poll tax is prohibited by law.

POLO, a ball game played on horseback on the same principles as hockey. It is the most ancient of all games of stick and ball, having had its origin in Persia, where certain odes, believed to antedate the Christian Era, sang of the glories of the game. In England and America its introduction is of comparatively recent date, where it has found great favor among the wealthy.

The players drive the ball forward and backward by means of a mallet, or stick with a cigar-shaped head eight or nine inches long and two inches thick and with a crook at the end. These mallets are about four feet four inches long. The ponies are ridden at full speed and eight men try to drive the ball between the goals at opposite ends of the field. Good polo ponies are very expensive, for they must be quick, strong, active and thoroughly trained; in fact, a good horse takes as much interest in the game as his master and follows the ball with almost the same zest. The riders change their horses at the end of each period. See **WATER POLO**.

POLO, MARCO (about 1250-1324), a Venetian traveler, born of noble family. His father, Niccolo, and his uncle, Maffeo Polo, were merchant seamen, whose business took them to distant ports. On one of their trips they visited China, where they were well received by Kublai Khan. In 1271 they made a second trip to China, taking Marco with them. The boy rapidly learned the language and customs of the country and became a favorite with the Great Khan, who employed him on various missions to neighboring princes. He made him governor of a province in Eastern China, an appointment Marco held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. Learning of Kublai's death, they resolved to return home, and they reached Venice in 1295. In the following year Marco Polo took part in a naval battle against Genoa, and was taken prisoner. During his captivity he dictated to a fellow prisoner an account of all his travels. After his liberation he returned to Venice, where he died. *The Book of Marco Polo* created a powerful thirst for adventure. Many believed that the wonderful stories were fabricated, but later travelers testified to their genuineness as history.

POLYGAMY, *po'li'ga mi*, the practice of having two or more wives at one time. Polygamy was not prohibited in ancient Greece, but it was rare, the same thing was true of Rome and of the early Germanic peoples. Among many Eastern peoples, on the other hand, it was customary, and in certain cases was enjoined as a social duty. However, it was never general, as only the rich could provide for several wives. Mohammedans favor polygamy, as did the Mormons, who practiced it openly until 1890, when laws were passed forbidding it. See **MORMONS**.

POLYGON, *po'li'gon*, a plane figure bounded by straight sides. Polygons are called triangles, quadrilaterals, pentagons or hexagons, according as they have three, four, five or six sides. The sum of the bounding



POLYGONS

lines of a polygon are called the *perimeter*. The junctions of the sides of the polygon are called its *vertices*; the angles formed by the meeting of any two sides are the *angles* of the polygon. If the sides of a polygon are

extended they form angles outside the polygon, and these are called *exterior angles*. A polygon is said to be regular when all its sides are equal (equilateral) and all its angles are equal (equiangular). It is *convex* when none of its sides if extended would cut any other of its sides; it is *cross* when one boundary line crosses another. The area of a polygon is equal to the number of sides times the area of each triangle.

POLYNESIA, *poli'nesia*, a term applied collectively to several groups of islands lying in the Pacific Ocean east of the 180th meridian, the international date line. Polynesia includes the Samoan, Tonga, Phoenix, Cook, Society, Marquesas and Hawaiian islands, as well as numerous smaller groups.

POLYP, *pol'ip*, the name of a group of minute water animals which commonly live in large colonies attached to stones or other anchorage at the bottom of salt or fresh water. The animals are very simple in structure, having soft, jellylike bodies with a fringe of wavy tentacles for grasping food. They increase rapidly, by budding, and a colony may attain treelike proportions. The jelly-fish and the fresh-water hydra, which belong to this family, live independent existences, moving about freely from place to place. See CORAL; COELENTERATA.

POLYPHEMUS, *poli'femus*, in Greek mythology, the hideous giant with one eye in the middle of his forehead, whom Odysseus (Ulysses) encountered in the course of his wanderings after the Trojan War. He lived with his brother Cyclopes on an island, where all day he fed his flock, retiring at night to a cave by himself. On their voyage from Troy to Greece, Odysseus and his companions were cast ashore on this island, and they took refuge in the cave of Polyphemus. When the giant returned and discovered them, he rolled a huge stone before the door so they could not escape, and at once devoured two of his prisoners. In the morning before taking his departure he ate two more. As he rolled the stone before the door when he left the cave, Odysseus and his companions were obliged to remain shut up all day, but during this time they sharpened and hardened with fire a large stick, which they hid. After supper that night Ulysses contrived to make Polyphemus drunk, and while he was in a drunken slumber, Ulysses and his companions heated in the fire the sharpened stake and plunged it into the giant's eye. Blind and maddened with

pain, Polyphemus was unable to seize any of his captives, and when in the morning he let his flock out, one by one, Odysseus and his companions having fastened themselves to the under side of the sheep's bodies, escaped.

POLYTHEISM, the belief in, and worship of, several gods; opposed to atheism and to monotheism, the belief in, and worship of, one god.

POMEGRANATE, *pum'gran ate*, a tree which bears an edible fruit and grows from eight to twenty feet high, producing numerous small, tough, highly flexible upright stems. It grows wild in Western Asia and parts of India and is cultivated extensively on Mediterranean shores and in the southern and western parts of the United States. The fruit, about the size of a large orange, has a very tough, russet-colored rind, and within this, occupying several compartments enclosed in dry, white, bitter pulp, are hundreds of small, bright-red pulpy seeds very juicy and often very acid. The Mexicans make from the juice a beverage which they call *agua-diente*.

POMERANIA, a province of Prussia in Northern Germany, lying along the Baltic Sea. Its area is 11,986 square miles, and the population in 1925 was 1,878,781. The interior is flat and in parts marshy. The principal river is the Oder, and the chief islands along the coast are Rugen, Usedom and Wolin. Although the soil is in general sandy, there are some rich alluvial tracts, which produce cereals, potatoes, beets and tobacco. Cattle raising is an important industry, and fish are taken in great quantities along the coast. The manufactures include glass, sugar, tobacco, woolen goods and distilled liquors. A considerable general trade is carried on, and this centers largely in Stettin, the capital of the province. Politically the province is divided into three districts, Stettin, Koslin and Stralsund.

POMERANIAN DOG. See SPITZ

POMONA, among the Romans, the goddess of fruit and flowers. According to legend she was wooed by Vertumnus, who, receiving no encouragement, disguised himself as an old woman, hoping thus to learn her secret. Unsuspecting, she confessed her love, and he, throwing off his disguise, secured her promise to marry him. In art Pomona is represented with a basket of fruit.

POMONA, CALIF., in Los Angeles County, thirty-three miles east of Los Angeles, on the

Santa Fé, Southern Pacific and Union Pacific railways. The city was named for the goddess of fruits, and is the center of one of the largest orange-growing regions in the world. Pomona is beautifully situated in the San Gabriel valley near the Sierra Madre Mountains and in a fertile irrigated area. There are a number of public buildings of note, including the Carnegie Library, the Masonic Temple and Norene Hospital. At Claremont, near by, are Scripps and Pomona colleges. Pomona is an important fruit market, and the leading industries are connected with marketing and preserving fruit. The city has large packing houses, canneries and creameries. Pomona ships about 4,500 carloads of oranges and 750 carloads of lemons, besides quantities of other fruits and nuts, each year. The first settlement was made in 1875. The commission form of government is in operation. The city is the seat of the Los Angeles County fair. There is an airport. Population, 1930, 20,804.

POMPADOUR, *pom pa door'*, JEANNE ANTOINETTE POISSON, Marquise de (1721-1764), a mistress of Louis XV of France. Her father, a well-to-do general, gave her a good education and she was introduced into the best society. At the age of twenty she married Lenormant d'Etholes, and four years later attracted the attention of the king, who installed her at Versailles as his mistress and gave her the title of Marquise de Pompadour. For twenty years she ruled the king, long as his mistress and afterwards as political advisor and purveyor of amusements. Ambassadors, prime ministers and generals found it necessary to seek her favor. She retained her position until her death at Versailles at the age of forty-three.

POMPANO, a fine food fish, bluish and silvery in color, that lives permanently about the Florida keys and comes north along the Atlantic coast to spawn in the spring. It is about eighteen inches long and is fished for with seines. There are a number of other species, elsewhere known as the pompano, among which is the highly prized *harvest fish*, that is found in the waters off Southern California.

POMPEII, *pom pa'ye*, an ancient city of Italy, which with Herculaneum and Stabiae was destroyed by the eruption of Mount Vesuvius in A. D. 79. For more than 1,500 years it lay undisturbed under its lava bed to a depth of twenty feet or more, with its

site unknown and its name almost forgotten.

The ancient city of Pompeii was founded in the sixth century B. C., and was situated near the Bay of Naples, about twelve miles southeast of Naples and at the base of Mount Vesuvius, on its southern side. Before the close of the Republic and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In A. D. 63 an earthquake destroyed a great part of the town. Rebuilding was soon begun, but in A. D. 79 the terrible eruption of Vesuvius ended its history.

Pompeii was completely forgotten during the Middle Ages, and it was not until 1748, when a peasant, in sinking a well, discovered a painted chamber with statues and a number of other objects of antiquity, that an interest in the locality was excited. Since that time extensive excavations have been carried on, and for this purpose the Italian government has appropriated money regularly for the prosecution of the work. A regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved. About half of the city has now been unearthed.

In addition to the lava hurled by Vesuvius, there had been clouds of wet ashes and cinders, which, on drying, hermetically sealed up Pompeii. The buildings thus when brought to light were in a remarkable state of preservation. The excavations give a complete picture of the political and social life in a provincial city in Italy in the first century after Christ. The town was built in the form of an irregular oval, extending east and west. The circumference of the walls was about two miles, and these were pierced by eight gates. The streets were straight and narrow and are now paved with large blocks of lava. In the center is the open square or forum, around which are grouped the chief public buildings, including the Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Gladiators' Barracks and two theaters. Several interesting private homes have been unearthed, but not very many objects of great value have been discovered, as most of the inhabitants escaped during the eruption and carried with them their movable valuables. However, the Museum of Naples owes many of its interesting features to the ornaments, statues and other movable works of art found in the public and private edifices.

POMPEY, in full, **GNAEUS POMPEIUS MAGNUS** (106-48 B. C.), a celebrated Roman general, who achieved distinction in arms at the age of twenty-three. In the struggle between Marius and Sulla Pompey raised three legions to aid the latter and regained for him the lost territories of Africa. On his return to Rome, Sulla greeted him with the surname of *Magnus* (Great), and Pompey received a popular ovation. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and completed the subjugation of the forces of Spartacus. In 70 B. C., although not of legal age, and without official experience, he was elected consul, with Crassus. In 67 B. C. he cleared the Mediterranean of pirates and destroyed their strongholds on the coast of Cilicia, and two years later, in command of the army, conquered Mithridates, Tigranes and Antiochus, subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was again honored with a triumph.

To strengthen his position, Pompey formed with Caesar and Crassus a coalition that came to be known as the First Triumvirate. At about the same time he married Caesar's daughter Julia. During Caesar's absence in Gaul, Pompey ingratiated himself with the Senate, was appointed sole consul and had the most important state offices filled with Caesar's enemies. Caesar was proclaimed an enemy to the state, and his rival was appointed general of the army of the Republic. Learning of this, Caesar crossed the Rubicon in 49 B. C. and in sixty days he was master of Italy without striking a blow. Pompey crossed over to Greece, and in that country, on the plains of Pharsalia, occurred the decisive battle which made Caesar master of the Roman world. Pompey fled to Egypt, where he hoped to find a safe asylum; but on landing he was stabbed by one of his former centurions.

Related Articles. Consult the following titles for additional information:

Caesar, Caius Julius	Rome
Crassus, Marcus L.	Spartacus
Lepidus, Marcus A.	Sulla, Lucius
Marius, Caius	Triumph
Mithridates	Triumvirate

POMPEY'S PILLAR, a celebrated column near Alexandria, Egypt. It is a monolith of red granite resting upon a pedestal about fifteen feet high; the total height is approximately ninety-eight feet. It was erected in

A. D. 302 by Publius, eparch of Egypt, to celebrate Diocletian's remission of part of the grain tribute. The name of the pillar is only an invention of tourists.

PONCE DE LEON, *pon'tha da la ohn'* **JUAN** (1461-1521), one of the early Spanish explorers in America, remembered chiefly because of his search for the "Fountain of Youth." He accompanied Columbus on his second expedition in 1493, became governor of the port of the island of Hispaniola (Haiti), and later conquered Porto Rico and became governor of that island. Having there amassed great wealth, he set out for a country to the north, where he had heard there was a fountain having wonderful restorative powers. He reached land near the mouth of the Saint John River on Easter Sunday (1513), a day in Spanish called *Pascua Florida*, and named the country accordingly. He sailed around Florida Keys and up the western coast, and believing he had discovered an island returned to Spain and secured permission to conquer and colonize the new territory. In 1521 he proceeded to take possession of his province, but the natives were hostile, and in combat with them Ponce de Leon was mortally wounded.

PONTCHARTRAIN, *pon char trayn'*, a lake of Louisiana, five miles north of the center of New Orleans. It is about forty miles long and twenty-five miles wide. In 1922 an Industrial Canal was completed, connecting Lake Pontchartrain with the Mississippi River at New Orleans, adding a siltless and currentless harbor for the city's commerce, and opening an immense area of low-value land for industrial development.

PONTIAC (1720-1769), a famous chief of the Ottawa Indians. He organized a confederation of tribes, including the Potawatomis and Ojibways, in the Mississippi Valley, from the Great Lakes to the Gulf of Mexico, to make war on the whites, who had encroached on his territory. In 1763 many forts were captured, and the settlers were massacred. Only Niagara and Detroit withstood the sieges and the fierce assaults. After peace was declared between France and England, Pontiac, in 1765, also made peace. He was murdered by a Kaskaskia Indian in 1769, and the Ojibways avenged his death by practically exterminating the Illinois tribes. Parkman's *Conspiracy of Pontiac* is a fascinating history of the great chief and his remarkable confederacy.

PONTIAC, MICH., the county seat of Oakland County, twenty-five miles northwest of Detroit, on the Clinton River and on the Grand Trunk Western Railroad. There is a city airport, admirably equipped. In the county are several hundred picturesque lakes, which afford good fishing and hunting and have on their shores many hotels, clubhouses and fine summer residences; twelve are near the city. The surrounding region is agricultural, and the city contains carriage factories, the Pontiac automobile factory, a Fisher-body plant, and an automobile truck factory, machine shops, a foundry, flour and lumber mills, a knit goods factory, gas engine works and other establishments. The Eastern State Hospital for the insane is here, and the city has a high school library and the ladies' library and a hospital. The place was settled about 1818, was named in honor of the Indian chief Pontiac, and was chartered as a city in 1861. The commissioner-manager form of government is in force. Population, 1930, 64,928.

PONTOON BRIDGE, a temporary bridge consisting of a board walk or roadway resting upon floating supports, called *pontoons*. The supports may be flat-bottom boats, but in military usage they are often metal cylinders or floats made of canvas. These bridges are often necessary in times of war, and in modern armies there are special pontoon divisions, trained to construct these bridges, and carrying a supply of equipment necessary for their building. So easily is the mechanical apparatus put together and so rapidly is the work done that a body of well-trained soldiers can span a river at the rate of about a hundred feet in twelve minutes.

POODLE, *poo'd'l*, a little, long-haired lap dog, popular in all parts of the world. The thick hair is silky and either curls or hangs in ropes. The eyes are black and vivacious and bespeak an intelligence which makes the dog popular.

POOL, a game played on a table which differs from the common form of billiard table only in having six pockets, into which the balls may roll. These pockets occupy the four corners of the table and the middle of each side. There are a number of different games of pool, of which the following may be considered the more important.

Fifteen-ball pool is a game played with one cue ball and 15 object balls. At the beginning of the game these object balls are put

in a frame and arranged in the form of a triangle in the middle of the foot of the table, with the apex pointing toward the players. The first player shoots from the head of the table at the triangle of balls and endeavors to knock them into the pockets. If he succeeds in putting one down, he shoots again, and so on until he misses a shot, when his opponent takes his turn, shooting from where the cue ball lies. After this manner the game is continued until all the balls are in the pockets. Then each player counts as many points as he has put balls into the pockets. If at any time a player knocks the cue ball into a pocket, one of the balls which he has put down is placed on the table again at the foot. The next player places the cue ball again at the head of the table and shoots as at the beginning of the game. It is customary to *call the shot*, that is, to indicate the pocket into which an object ball is to be driven. In the common form of the game, all of the object balls are of uniform red, but the game may be modified by having the object balls of different color, each bearing a number, in which case the count is made according to the numbers on the balls which are put into the pockets. Any number of people from two to a half-dozen may play the game.

Pin pool is played on a regular pool table or on a billiard table. Five small pins are placed in the center of the table on five spots, which are numbered as in the following diagram, in which the number 1 is toward the head of the table:

```

      4
    3 5 2
      1
  
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Each pin counts as many points as are indicated by the number of the spot on which it stands. Three balls are used, two object balls and a cue ball. At the beginning of the game the two object balls are placed on spots at the ends of the table, and the pins are placed in the center. The cue ball is shot from the head of the table at the farther object ball, with the purpose of knocking down the pins with either of the balls, after hitting the object ball. At the beginning of the game each player is given, usually from a leather bottle, a small ball, on which is marked a number. This number the player counts as the beginning of his score, but makes no announcement of it unless he wins the game, which consists of exactly 31 points. If a

player's score becomes greater than 31 he "bursts" and loses all that he has made and must begin over. Whenever the pins are knocked down, they are put back upon the spots where they originally stood. If in any shot the player knocks down the four outer pins, leaving the center one standing, he wins the game. Any number may play.

Other Games. Other games which are modifications of the two pool games described are numerous. Sometimes the leather bottle, one pin and an object ball are used, and the bottle and pins are set upon the table where they fall, the former counting 10 and the latter 5, and the game being any number previously determined on. A different game may be played on the regular pool table, in which four balls are used, one counting 5, another, 3, and a third, 1, when put into the pockets. In this game the player scores also regular billiard shots. If the cue ball is put into the pocket at any time the player loses all he has made in that turn and must give way to the next player. Whatever the number fixed for the limit of the game, it must be made exactly. If the person makes too many points, he loses all that were made in that turn.

POOLE, WILLIAM FREDERICK (1821-1894), an American librarian, born at Salem, Mass., and educated at Yale College. In the course of his college term, and while serving as a librarian, he compiled the first edition of his well-known *Index to Periodical Literature*, of which many subsequent editions and supplements were published. After graduation he became successively librarian of the Boston Mercantile Library, of the Athenaeum, of the Cincinnati Public Library, the Chicago Public Library and the Newberry Library, Chicago. He organized several large libraries, including that of the United States Naval Academy at Annapolis. He was prominent in the larger library activities and was a historian of some note. At one time he was president of the American Library Association. His writings include *The Battle of the Dictionaries*, *Cotton Mather and Salem Witchcraft* and *Anti-Slavery Opinions Before 1800*.

POONA, BRITISH INDIA, a well-built city of Bombay Presidency, is situated on the River Mutha, about seventy-five miles south-east of Bombay. It has the Deccan College for classics, mathematics and philosophy; a government college of science, with special training in civil engineering; normal schools, and other educational institutions, together

with a public library and a hospital. Poona was formerly the capital of the Peshwa, head of the Mahratta confederacy. The city stands 1,850 feet above the sea, and is a health resort. For a part of the year it is the seat of the Bombay government. Two miles from the city are cantonments for the army. Its manufactures include gold and silver jewelry, small ornaments in brass and ivory, and silk and cotton fabrics. It is an important military station, and good roads connect it with other cities. Population, 1931, 250,187.

POOR RICHARD'S ALMANAC, a popular almanac published by Benjamin Franklin from 1732 to 1757, under the assumed name of "Richard Saunders." The almanac contained, in addition to the usual almanac material, numerous proverbs, maxims, and a fund of commonsense advice. About ten thousand copies of the almanac were sold annually, and it exerted a wide influence in the colonies. See FRANKLIN, BENJAMIN.



Statue of St Peter,
in St Peter's

POPE, the name given to the bishop of Rome, the head of the Roman Catholic Church. The Emperor Phocas decreed that to the Roman pontiff exclusively belonged the distinction of universal bishop. Saint Peter is regarded as the first of the pontiffs of the Roman Catholic Church, because of Christ's words, "And I say to thee; That thou art Peter, and upon this rock I will build my Church; and the gates of hell shall not prevail against it." According to tradition, Peter planted a church at Rome and died there a martyr.

The Pope is elected by a two-thirds vote of all the cardinals, who assemble as the college of Cardinals for that purpose. See SACRED COLLEGE.

Early History. Leo I, surnamed the Great (440-461), aimed to establish in the East and West a system of Papal vicariates, through which the Roman jurisdiction could be enforced and the Roman forms of faith permanently maintained. In the West he succeeded, but in the East his success was only partial and temporary. In 451 the Council of Chalcedon accepted the creed formulated by Leo, stating fully and clearly the belief in the

union of the divine and human natures of Christ in one person. The fact that in 452, armed with none but spiritual weapons, Leo went out to meet the terrible Attila and actually induced him to leave Italy without attacking Rome, is a convincing proof of the faith of the Pope and the power of the Church at this time.

During the German occupation of Italy, the relations of the Popes with the barbarian rulers were friendly, and the Church continued to prosper. Under the Byzantine sovereignty, the prestige of the Church seemed in danger of disappearing. But this calamity was averted by the invasion of the Lombards, who drove the Byzantine garrisons from the country. During the following centuries of change, confusion and ruin, the Christian Church alone retained its organization. Even the Lombards were in time converted to Christianity, and the people who, until the overthrow of the emperor, had been accustomed to depend upon Rome for guidance in temporal affairs, now continued to look thither for spiritual control, and the bishop of Rome was acknowledged throughout Western Europe as the head of the Church. Thus for centuries the Papacy gained strength, the Christian fathers, Augustine, Gregory the Great, and a host of other active men, shaping its doctrines and policy. In 754 Pepin I, the Frankish king, expelled the Lombards from their recent conquests and guaranteed to the Papacy the temporal sovereignty of a stretch of territory including Rome, and a considerable surrounding country (see PAPAL STATES).

In the year 800, Pope Leo III crowned Pepin's son Charlemagne Holy Roman emperor, thus restoring the Western Empire. Many causes now combined to extend the power of the Church. During the political strife of the Dark Ages the Church afforded a refuge to the oppressed. In the convents and monasteries alone did learning flourish. Priests were therefore the teachers, secretaries and ambassadors of kings.

Gradually the bishops acquired the right to try all cases relating to marriage, trusts, perjury, simony, or concerning widows, orphans or Crusaders, and even some criminal cases. Thus by the end of the twelfth century the Church had absorbed not only the whole legislative power over the clergy, but in part over the laity also. Consequently, the principle was established that all cases

might be appealed from the courts of the bishops and archbishops of the different European countries to the Pope. The Pope thus came to be regarded as the fountain of justice and the supreme judge of Christendom, while emperors and kings bore the sword simply as his ministers to carry into effect his sentences and decrees.

Influence of the Crusades. In the tenth century, when Otto the Great assumed the title of Holy Roman Emperor, there began between the Pope and the emperor a contest for supremacy which lasted many centuries. During this time all Christendom was virtually divided into two parties, the members of which were respectively supporters of the imperial or the papal claims. The Crusades greatly strengthened the papal power, as the prominent part which the Popes took in them naturally fostered the papal authority, by placing in the hands of the Popes the armies and resources of Christendom and accustoming the people to look to them as guides and leaders.

Reforms of Gregory VII. Pope Gregory VII, or Hildebrand, by means of excommunication and interdict, carried on two important reforms, the enforcement of celibacy among the secular clergy and the suppression of simony, thus doing much toward establishing the universal spiritual and temporal sovereignty of the Pope. In the thirteenth century the papal power gained a signal triumph over the imperial party by its victory over the House of Hohenstaufen. In the period which follows, the authority of the Popes was at its height. Under Pope Innocent III (1198-1216), almost all the kings and princes of Europe swore fealty to the Pope as their overlord.

Removal of Papal Chair to France. One of the severest blows given both the temporal and the spiritual authority of the Popes was the removal in 1309 of the papal chair from Rome to Avignon, France. During the seventy years or so while it remained there, all the Popes were French and, their policies being shaped according to French ideas, the Papacy ceased to possess that sacred cosmopolitan character which had hitherto characterized it. The Catholic world was not again united under a spiritual head until the election of Martin V in 1417. But the temporal rulers of France, Germany and England, taking advantage of the disturbed condition of the papal see, successively revolted and freed

themselves from the authority of the papacy as touching political or governmental affairs. They continued, however, to recognize the Pope as the head of the Church and the rightful arbiter in all spiritual matters. In the sixteenth century the Popes took such a prominent part in the political movements of Europe that their territory and jurisdiction were greatly extended, but the opposition which had been slowly gathering in the North culminated in the Protestant Reformation, which directly challenged the traditional supremacy of the Papacy. The answer of the Church was clearly set forth in the decrees of the Council of Trent (1543-1553), which reaffirmed in unmistakable terms the beliefs of the Church of Rome.

Recent Changes. At the close of the eighteenth century and in the nineteenth changes took place in Europe which closely affected the papal power. In 1797 the Pope was obliged to cede several of the states of the Church to Napoleon. A year later the remaining Papal States were erected into a Roman republic, but in 1801 the papal power was partly restored over them. In 1808-1809 they were incorporated in the French Empire, but were again restored by the aid of the Austrians in 1815. When Pius IX ascended the papal throne in 1846, his chief aim was to bring about a confederation of the Italian states under the papal supremacy. With this object in view, he placed himself at the head of the movement for reform, reorganized the municipal government of Rome and granted a constitution to the Papal States. In 1848 Pius was forced to flee to Gaeta, while Rome was proclaimed a republic. In 1850 he was restored to his rightful place by the aid of the French.

In 1860 a large part of his dominions was annexed by Victor Emmanuel, and in 1870 the remnant of the Papal States voted for union with the kingdom of Italy, depriving the Pope of dominion. In accordance with the conviction of Roman Catholics that the head of the Church should not be subject to any temporal ruler, the Popes for nearly sixty years remained in the Vatican as "voluntary prisoners", but still as the supreme head of the Church.

In February, 1929, the Pope's temporal power was restored by a treaty with the Italian Government, by which Vatican City was created a sovereign state as the seat of the papacy. See VATICAN.

By the decrees of the Vatican Council of 1870, the Pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra*, that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole Church, he possesses infallibility, by divine assistance. The Pope cannot annul the constitution of the Church as ordained by Christ. He may condemn or prohibit books, alter the rites of the Church and reserve to himself the canonization of saints. A Pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara, or triple crown, the straight crosier and the pallium. The pontiff is addressed as "Your Holiness."

Table of Popes. We subjoin a table of the Popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names following a dash are those of anti-Popes.

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St Marcellinus	. . . 286	Great	. . . 590
(See vacant 3		Sabinianus . . .	604
years and 6		Boniface III . .	607
months)		St Boniface IV . .	608
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dorus, Paschal	686
St. Sergius I	687
John VI	701
John VII	705
Sisinnius	708
Constantine	715
St. Gregory	731
St. Gregory III	741
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Stephen II (died	
before conse-	
cratation)	752
Stephen III	752
St. Paul I—Con-	
stantine, Theo-	
phylactus,	
Philip	757
Stephen IV	768
Adrian I	772
St. Leo III	795
Stephen V	816
St. Paschal I	817
Eugenius II	824
Valentinus	827
Gregory IV	827
Sergius II	844
St. Leo IV	847
Benedict III—	
Anastasius	855
St. Nicholas I	858
Adrian II	867
John VIII	872
Marinus I, or	
Martin II	882
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(reigned only	
18 days)	896
Stephen VII	896
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Sergius III	898
John IX	898
Benedict IV	903
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Sergius III	904
Anastasius III	911
Lando	913
John X	914
Leo VI	928
Stephen VIII	929
John XI	931
Leo VII	936
Stephen IX	939
Marinus II, or	
Martin III	943
Agapetus II	946
John XII—Leo	
VII	955
Benedict V	955
John XIII	955
Benedict VI	972
Donus or Domnus	
II	974
Benedict VII	975
John XIV—Bonif-	
ace VII	983
John XV	985
Gregory V—John	
XVI	996
Sylvester II	999
John XVI or	
XVII	1003
John XVII or	
XVIII	1003
Sergius IV	1009
Benedict VIII—	
Gregory VI	1012
John XVIII or	
XIX	1024
Benedict IX (de-	
posed)—John	
XX	1033
Gregory VI—Syl-	
vester III	1045
Clement II	1046

Damasus II—	
Benedict IX at-	
tempts to re-	
sume the	
throne	1048
St. Leo IX	1049
Victor II	1055
Stephen X	1057
Nicholas X	1058
Alexander II—	
Honorius II	1061
Gregory VII	
(Hildebrand)—	
Clement III	1073
(See vacant 1 year)	
Victor III	1086
Urban II	1088
Paschal II—	
Gelasius II—	
Gregory VIII	1113
Calixtus II	1119
Honorius II—Cel-	
estine II	1124
Innocent II—An-	
acletus II, Vic-	
tor IV	1130
Celestinus II	1143
Lucius II	1144
Eugenius III	1145
Anastasius IV	1153
Adrian IV (Nich-	
olas Break-	
spear, an Eng-	
lishman)	1154
Alexander III—	
Victor V	
Paschal III	
Calixtus III	
Innocent III	1159
Lucius III	1181
Urban III	1185
Gregory VIII	1187
Clement III	1187
Celestinus III	1191
Innocent III	1198
Honorius III	1216
Gregory IX	1227
Celestinus IV	1241
(See vacant 1 year	
and 7 months)	
Innocent IV	1243
Alexander IV	1254
Urban IV	1261
Clement IV	1265
(See vacant 2	
years and 9	
months)	
Gregory X	1271
Innocent V	1276
Adrian V	1276
John XIX or XX	
or XXI	1276
Nicholas III	1277
Martin IV	1281
Honorius IV	1285
Nicholas IV	1288
(See vacant 2	
years and 3	
months)	
St. Celestinus V	1294
Boniface VIII	1294
Benedict XI	1303
Clement V (pap-	
acy removed to	
Avignon)	1305
(See vacant 2	
years and 3	
months)	
John XXII	1316
Benedict XII—	
Nicholas V at	
Rome	1334
Clement VI	1342
Innocent VI	1352
Urban V—Clem-	
ent VII	1362
Gregory XI	
(throne re-	
stored to	
Rome)	1370
Urban VI	1378

Boniface IX —	
Benedict XIII	
at Avignon..	1389
Innocent VII	1404
Gregory XII	1406
Alexander V	1409
John XXIII	1410
Martin V—Clem-	
ent VIII	1417
Eugenius IV —	
Felix V	1431
Nicholas V	1447
Calixtus III	1455
Pius II	1458
Paul II	1464
Sixtus IV	1471
Innocent VIII	1484
Alexander VI	1492
Pius III	1503
Julius II	1503
Leo X	1513
Adrian VI	1522
Clement VII	1523
Paul III	1534
Julius III	1550
Marcellus II	1555
Paul IV	1555
Pius IV	1559
St. Pius V	1566
Gregory XIII	1572
Sixtus V	1585
Urban VII	1590
Gregory XIV	1590
Innocent IX	1591
Clement VIII	1592
Leo XI	1605
Paul V	1605
Gregory XV	1621
Urban VIII	1623
Innocent X	1644
Alexander VII	1655
Clement IX	1667
Clement X	1670
Innocent XI	1676
Alexander VIII	1689
Innocent XII	1691
Clement XI	1700
Innocent XIII	1721
Benedict XIII	1724
Clement XII	1730
Benedict XIV	1740
Clement XIII	1750
Clement XIV	1769
Pius VI	1775
Pius VII	1800
Leo XII	1825
Pius VIII	1829
Gregory XVI	1831
Pius IX	1846
Leo XIII	1878
Pius X	1903
Benedict XV	1914
Pius XI	1922

POPE, ALEXANDER (1688-1744), an English poet, the most influential of his age. As he was sickly and deformed, his education was desultory. He picked up the rudiments of Greek and Latin from the family priest and supplemented this and subsequent schooling in private institutions with much unsystematic reading. Before he was fifteen he attempted an epic poem, and by the time he was eighteen he had finished a volume of *Pastorals*, which attracted notice. In 1711 he published a poetical *Essay on Criticism*, which was followed by *The Rape of the Lock*, a polished and witty narrative poem, founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer, a pastoral poem, and *The Epistle of Eloisa to Abelard*. From 1713 to 1726 he was engaged on a rhymed translation of the *Iliad* and the *Odyssey*, the latter being accomplished with the aid of assistants. The *Iliad*, while a clever production, does not reproduce the spirit of the original. The critic Bentley, on first reading the translation, said, "It is a pretty poem, Mr. Pope, but you must not call it Homer." In 1728 Pope published *Dunciad*, a mock heroic poem, intended to ridicule his detractors; and in 1742 he added to it a fourth book, in which he lampooned Colley Cibber, then poet laureate. The *Dunciad* was followed by *Imitations of Horace* and by *Moral Essays*, one of which was the much quoted *Essay on Man*.

In his own day, Pope was considered the greatest of English poets. Later judgment

has modified this estimate considerably, and some critics hold that Pope was not a poet at all, in the true sense of the term. But while he had little genuine feeling and little imagination, he possessed the art of turning a neat phrase; and his platitudes, expressed in rhyming couplets, have been oftener quoted than any other utterances in English except Shakespeare's.

POPULAR, a genus of trees belonging to the same family as the willow. Twenty-five species are known, eleven of them being native to North America. The poplars are rapidly-growing trees, and they form extensive forests in low lands and on the slopes of mountains. The heart-shaped leaves are pale green above and silvery beneath, and are attached to long leaf-stalks which are flattened at right angles to the blade, giving the leaf a tremulous motion. This characteristic of the poplar gave rise to the expression "trembling like an aspen leaf," the aspen being a well-known species of poplar. The flowers appear in long, yellowish-red catkins, and the tiny seed is attached to cottony filaments by which it is carried through the air. The bark is pale gray or reddish-brown and the wood is light, soft and brittle. It is used in making packing cases, and is valuable for paper pulp. The *cottonwood*, the *aspen*, the *balm of Gilead* and the *Lombardy poplar*, with its upward-pointing branches, are the best-known species.

POPLIN, *pop'lin*, a dress fabric consisting of a warp of silk and a weft of worsted. The weft is heavier than the warp, and the result is a corded surface. The material is stout and strong and at the same time soft and elastic. Poplins are dyed in various colors, and they have a wide usage, not only as dress goods but also as upholstering material.

POPOCATAPETL, *po po'kat a pet'l*, a volcano in Mexico, practically dormant since 1548, situated forty miles from Mexico City, from which it is visible. It is cone-shaped and capped with snow, and below the snow line covered with forests. The crater, about 2,600 feet in diameter and 600 feet deep, contains deposits of purest sulphur. The volcano emits clouds of smoke and ashes, hence its Aztec name, which means *smoking mountain*.

POPPY, a plant originating in the Far East, highly valued for its beauty and as the source of opium. It is hardy and easily cul-

tivated, and the flowers, both single and double, are bright and showy; though the blossoms shatter quickly, they are rapidly replaced by others.

Poppies grow easily from seeds sown broadcast; in parts of Europe they grow wild. Among the most ornamental species are the *Iceland Poppy*, which is orange or yellow; the *Oriental poppy* and *corn poppy*, both bright red, and the *California poppy*. The *opium poppy* is white (see **OPIMUM**).

In addition to opium, it produces an oil, contained in the seeds, which is used in Europe as fertilizer and cattle feed. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla has four petals; the stamens are numerous, and the capsule is one-celled, with several longitudinal partitions and a multitude of seeds. Because of its narcotic principle, the poppy has stood among poets and artists from time immemorial as a symbol of sleep.

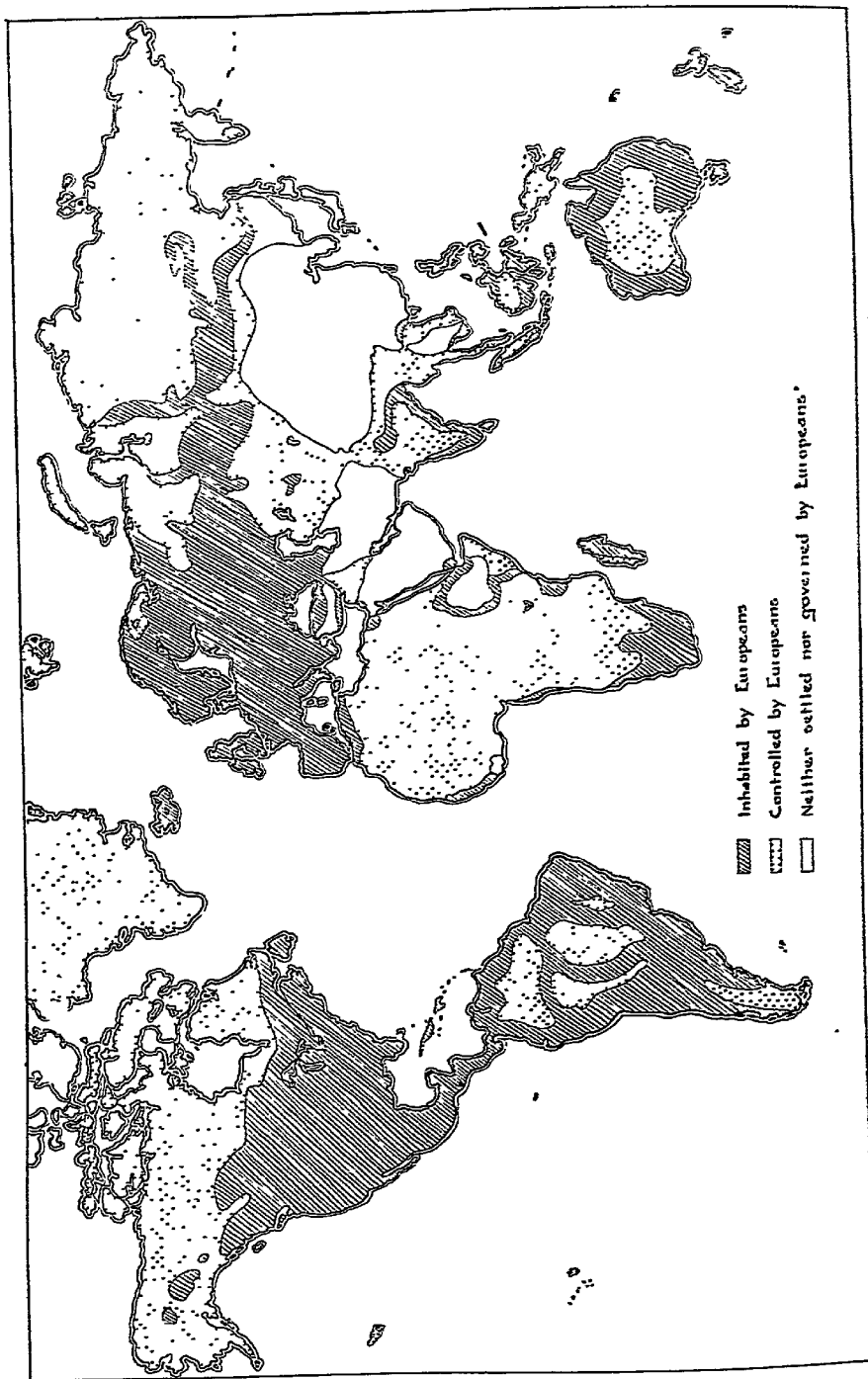
POPULAR SOVEREIGNTY. See **SQUATTER SOVEREIGNTY**.

POPULA'TION. By *population* of a country is meant the total number of men, women and children that it contains. The greatest asset of a nation is its number of healthy, contented men and women, and its greatest source of future wealth is its boys and girls. Therefore the study of population statistics is of vital interest and importance.

Population of the World. At the end of the year 1931 the population of the world was estimated by the League of Nations to be 2,136,767,000. The number of people has been increasing at the rate of about 30,000,000 a year, excluding World War years and their aftermath. The causes of this remarkable increase are found in improved sanitation and the rapid advance in medical science, both of which have greatly reduced infant mortality; and in the effect of these improvements and the increase in general knowledge upon adults in lengthening the span of life. Everyone has a better chance to live a longer life.



POPPY



THE SPREAD OF EUROPEAN CIVILIZATION OVER THE WORLD

The following table shows the increase in population of the continents, roundly in millions for slightly more than a century:

YEAR	EUROPE	NORTH AMERICA	SOUTH AMERICA	ASIA	AFRICA	AUSTRA-LASIA
1875	180	10	7	389	99	8
1921	541	169	78	1098	166	8

About nine-tenths of the people who comprise the estimated 2,136,767,000 in the world are within the jurisdiction of twelve principal governments. The World War's toll of life, directly and indirectly, checked the annual increase in population, which in close to two decades has not fully returned to normal. It is estimated that the lives of 33,000,000 people were sacrificed in the war from death on battlefields, wounds which later proved fatal or destroyed all usefulness, and from extreme privation resulting from war's tragedies.

For the fifty years before the war normal growth was practically unimpeded. The United States increased in population 190 per cent, Russia (in Europe), 90 per cent; Germany, 62 per cent, England, 59 per cent; Austria-Hungary (dismembered in 1919), 50 per cent, France, only 10 per cent.

It must not be overlooked that statistics from some parts of the world are but the result of keenest possible observation, in the absence of a census. There are wide discrepancies. For example, a Harvard professor declares that 150,000 people are born every day, and 100,000 die. His figures are about 11,000,000 below the League of Nations' estimate of yearly population gains, as noted above.

Sex. From enumeration of about one-half the population of the world for the purpose of determining the relative proportion of the sexes, it appears that about 50.3 per cent are male and 49.7 per cent female, Europe, however, forms an exception. On that continent before the World War 50.6 per cent of the population were females and 49.4 per cent males, and the war increased this difference.

Growth of Cities. Another marked change in population during the nineteenth century was the massing of people in cities in all civilized countries. But nowhere is this shown more strongly than in the United States, especially since the completion of its first century as an independent nation. In

1880, 14,772,432 (29.5 per cent) of the population resided in cities of 2,500 or more inhabitants. In 1910 urban population had increased to 42,623,283 (46.3 per cent). In 1930 the urban population was 68,954,823 (56.2 per cent). This tendency is largely due to growth of manufacturing in cities. See CITY.

Vital Statistics. That branch of statistics which deals with the growth and changes in population is called *vital statistics*. It derives its facts from two sources, the census and registration. Censuses are taken periodically (see CENSUS), and they give the population at a specified date. Registrations include births, deaths and marriages. The results obtained from studying vital statistics are called *rates*. The rate is determined by studying the registration of a definite group of people in a given locality for a given time. The number of people in the group is usually 1,000 and the time one year. The number of deaths in such a group would be the death rate of the group. But usually in determining these rates the entire population of a city or state is considered. Rates obtained from such comparisons are known as *general rates*, as the general death rate and birth rate for the state of Ohio. The accuracy of the rate depends upon the completeness of the registration, and in this respect European countries are far in advance of the United States. See MORTALITY, LAW OF.

Interesting Facts. A study of the death rate of different countries reveals interesting facts. Among all the large nations, the general death rate is highest in Russia, where it is 31.2 per thousand. The sections having the lowest rate have been Australia, Great Britain, Denmark, Norway, Sweden, Holland and some of the states of the United States. The rate is highest during the first year, and after the 80th year. The death rate of male children in England under normal conditions during the first year, for example, is 161. The lowest death rate for each sex is reached in the ages 11 to 13. In general, the death rate among females is lower than among males.

The birth rate is usually high where the death rate is high, though some countries having a high birth rate have a low death rate. The birth rate in America and Australia has decreased since 1880. There are not sufficient data to enable statisticians to determine whether or not the birth rate in the United States is high enough to enable the native

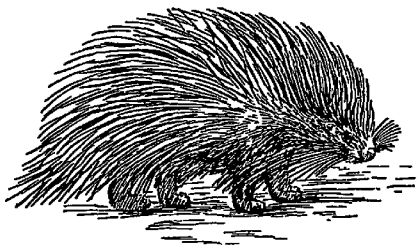
population to maintain itself by excess of births over deaths.

In most countries over one-half the people of marriageable age marry. The highest marriage rates have been in Saxony, Russia, Hungary and Yugoslavia. Definite statistics for the United States and Canada are not obtainable.

POPULIST PARTY, or **PEOPLE'S PARTY**. See **POLITICAL PARTIES IN THE UNITED STATES**.

PORCELAIN, *pawr'se lain*, or *pawrs'lain*, a fine earthenware which differs from ordinary pottery in being whiter and harder and in having a translucent quality. It was first made in China about the third century B. C. and is therefore called *china*, or *chinaware*. The first successful attempt in manufacturing it in Europe was made in the fifteenth century, in Italy. About one hundred years later the manufacture of porcelain was begun in Germany, under the direction of Johann Bottger, whose product—known as Dresden ware—from the place of manufacture, was to gain world-wide popularity. This ware, like the Chinese porcelain, is called *hard* porcelain, and is made of kaolin and feldspar (see **DRESDEN CHINA**). Much of the porcelain of commerce is made with gypsum, bone ash and other material, and is called *soft* porcelain. It is not so choice as the hard, but it includes many famous varieties—Chantilly, Sèvres and Limoges in France, and Derby, Chelsea and Worcester in England. Porcelain is the ideal material for ordinary table service, and the porcelain industry is among the largest in the world. Although fine porcelain is very costly, cheaper grades, artistic in design and decoration, are within the reach of the moderate purse.

PORCUPINE, *pawr'ku pine*, a large forest rodent, whose distinguishing characteristic is



PORCUPINE

a covering of sharp spines, or quills, intermixed with coarse, stiff hair. It is from two

to three feet long, and the tail adds six inches. The quills, the size of goose quills, are often more than a foot long and are sharp-pointed. These quills point backward, but when the animal is excited or angry, the bristles are erected and used for defense; rarely are they raised in offensive attack. When the animal rolls itself up into a ball, with quills pointing in every direction, it is almost invulnerable to attacks of its forest enemies.

Poreupines are divided into two chief groups, the Old World poreupines, which live on the ground and burrow in it; and New World poreupines, which are tree-inhabiting. Of the former group the best known, the common poreupine, is a solitary animal that prowls at night, lives on a vegetable diet and in winter crawls into its burrow and becomes torpid. The North American poreupine is yellowish-white, with some black hairs. The Canadian animals divide their time between evergreen trees and rocky shelters on the ground. The flesh of the young is good to eat.

PORCUPINE, ONT., 450 miles north of Toronto, is the center of a great mining camp. **TIMMINS** is the most important town in the district. Here are located gold mines which produced \$10,000,000 in 1931, since then production has declined. The town has all modern conveniences, a high school and a technical school. Population of Timmins, 1931, 14,200.

PORGY, or **POR'GEE**, a fine food fish, common in the Mediterranean Sea and in the Pacific and Atlantic oceans. Of the several American species the most common is the scup of the Atlantic coast. The red porgy of the Gulf of Mexico, about two feet long, is in great demand for the market.

PORK, the flesh of the hog. In the United States pork is more generally used than any other meat. Large quantities are also shipped to European countries. The variety of products is greater than from any other kind of meat. Pork contains more fat than beef or mutton, is not so easily digested and needs to be thoroughly cooked. About 45,000,000 hogs are slaughtered in the United States each year.

Related Articles. Consult the following titles for additional information.

Bacon	Meat
Ham	Meat Packing
Lard	Sausage

POROSITY, the property of possessing pores, characteristic of all matter. Some substances, such as sponge and bread, have

large pores, while others, like iron and gold, have extremely small ones, too small even to be detected by the most powerful of microscopes. The porosity of such dense substances is proved by the fact that water and certain gases may be forced through them by hydrostatic pressure.

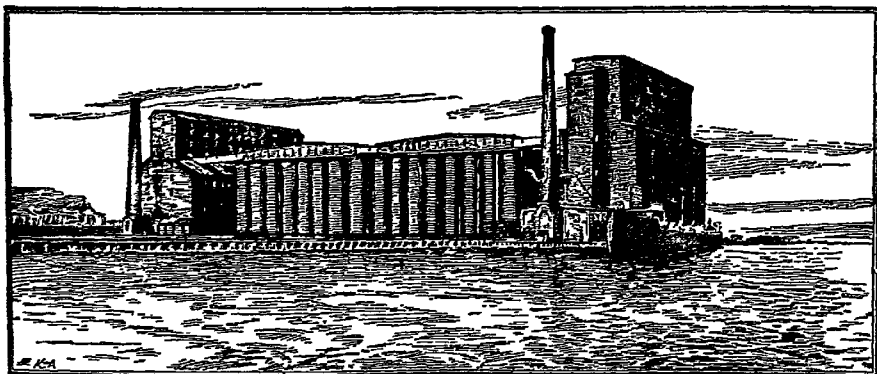
PORPHYRY, *por'firy*, a marblelike substance composed of two different kinds of rock. The mass is usually feldspar, through which are distributed large crystals of some other material, giving the whole a speckled appearance. It varies considerable in tone, ranging from very light to dark, and differs, too, in color, green, red, ochre being conspicuous. Like marble, it takes a high polish and is valuable as an ornamental building stone.

PORPOISE, *por'pus*, a marine mammal belonging to the same family as the dolphin. The common porpoise, of frequent occurrence in northern seas, has a spindle-shaped body about seven feet long. The thick skin, dark above, light underneath, is hairless and is underlaid with a layer of fat, which yields a valuable oil. The eyes are small, and between them is a crescent-shaped blowhole by means of which the animal makes a puffing noise. Each jaw is provided with from forty to fifty teeth, and the animal feeds on smaller fishes, chiefly herring and mackerel, some-

cific railroads and connection with the Great Northern gives it direct communication with Minneapolis, Saint Paul and other American cities. The chief industries include flour and oatmeal mills, brick yards, a sash and door factory, a pump factory, a steel grain-bin plant, and plants for the manufacture of threshing machines. There are seven large elevators.

The city has a number of parks, Island Park, immediately south of the city and nearly surrounded by Crescent Lake, being one of the most beautiful parks in Western Canada. It is the seat of a collegiate institute and a normal school. There is a hospital, a home for incurables, an old folks' home and an armory. Population, 1931, 6,597.

PORT ARTHUR, *MANCHURIA*, is situated at the extremity of the Liaotung peninsula, on the Strait of Pechili, and at the terminus of one of the branches of the Trans-Siberian Railway. The town has an excellent harbor which has been enlarged and improved. Port Arthur was captured by the Japanese after a memorable siege during the Russo-Japanese War, and it is now an important Japanese naval station. The Japanese also maintain a garrison in a fort here, which before the World War was believed to be impregnable. Port Arthur was formerly an insign-



A PORT ARTHUR GRAIN ELEVATOR

times ascending estuaries for its prey. Schools of these animals are not uncommon in North Atlantic waters. See **DOLPHIN**.

PORTAGE LA PRAIRIE, *MAN.*, situated on the Portage plains, fifty-six miles west of Winnipeg. It is on the Canadian Pacific, the Canadian Northern and the Grand Trunk Pa-

nifican Chinese fishing village. Later it was converted into a fortified naval station to defend Peking. Its prominence in the Russo-Japanese War gave it worldwide fame. It has a population of about 18,000.

PORT ARTHUR, *ONT.*, the thirty-sixth city in size in the Dominion, in the Thunder

Bay district, at the head of Lake Superior, two and one-half miles from Fort William. Two great railway systems, The Canadian Pacific and Canadian National railways, together with exceptional opportunities for water transportation, make Port Arthur an important collecting and distributing point, especially for the grain-growing regions. The report of the Board of Trade shows a total of over 92,000,000 bushels of grain shipped from Port Arthur and Fort William in average years; the Canadian National's great elevator, with a capacity of 7,500,000 bushels, is said to be the largest in the world. There are also large fishing, mining and lumbering interests. A blast furnace, large coal and iron ore docks, a drydock and ship-building plant, cold storage plants, saw mills and foundries are among other large establishments. About 350,000 tons of pig iron are shipped from Port Arthur each year. A public library, an armory, a Y. M. C. A., a sailors' institute and district judicial buildings are features of the city. Population, 1921, 14,886, 1931, 19,818.

PORT ARTHUR, Tex., a seaport of Jefferson County, on Sabine Lake and the Kansas City Southern and the Southern railroad. A great oil company has an airport. It is also on the Intercoastal, the Sabine-Neches and the Port Arthur ship canals, and the largest ocean vessels can reach the city. There are extensive oil fields in the vicinity, and the city is a center for oil refining. There are rice mills, also, for the place is tributary to the greatest rice plantations of the South. There are pleasure resorts, a Federal building, an armory, and a college. The city is governed on the commission-manager plan. Population, 1920, 22,251; at the 1930 census, 50,902.

PORT-AU-PRINCE, *por to prahn's*, the capital and chief city of the republic of Haiti, is situated on the west coast of the island, at the southeast extremity of the Bay of Gonaives. It is built on low, marshy ground and is unhealthful. The city is well laid out with broad, regular streets, but the buildings are of wood and are poor, and many of them are in a neglected condition. The most important structures are a palace, the senate house, a cathedral, a customhouse, a mint, a hospital and a college. It has a United States consul. The inhabitants are chiefly mulattoes and negroes, who are very ignorant and lazy. They speak an imperfect

French dialect. The chief exports are coffee, coconuts and cabinet woods. Population, 1935, estimated, 125,000.

PORTE, THE SUBLIME. See **CONSTANTINOPLE**.

PORT ELIZABETH, a seaport of the province of Cape of Good Hope, Africa, is at the west end of Algoa Bay, about 435 miles east of Cape Town and about 380 miles southwest of Durban. Its harbor is protected by jetties, and the city has such an exclusive trade that it is called the "Liverpool of South Africa." It ranks next to Cape Town, the capital, in population. The important buildings include a town hall, a postoffice, courthouse, library and the Feather Market, where an annual sale of ostrich feathers is held. Population, about 31,000, of which 18,200 are whites.

PORTER, DAVID (1780-1843), an American naval officer, born at Boston. He early went to sea and was twice impressed by the British, but escaped. In 1798 he entered the United States navy as midshipman, and served on the *Constellation* in the famous battle with the *Insurgent*. During the war with Tripoli, in 1803, he was captured when his ship, the *Philadelphia*, grounded in Barbary waters. As captain and commander of the *Essex* in the War of 1812, he captured many British vessels. At the close of the war he was made commodore and commanded expeditions against the West Indian pirates. For compelling the Spanish authorities at Porto Rico to apologize for an insult to his flag, thus exceeding his authority, he was suspended for six months. This so incensed Porter that he resigned and joined the Mexican navy, remaining in it until 1829. Thereafter he served the United States as consul-general to the Barbary powers and as *chargé d'affaires* at Constantinople. He was father of Admiral David Dixon Porter and, by adoption, of David Glasgow Farragut.

PORTER, DAVID DIXON (1813-1891), an American admiral, son of Commodore David Porter. He was born at Chester, Pa. In his youth he served in the Mexican navy, entered the United States navy as midshipman in 1829, and as lieutenant served with distinction in the Mexican War. At the beginning of the Civil War he was placed in command of the steam frigate *Powhatan*, and his services soon won for him the rank of commander. His able cooperation with Grant in the siege of Vicksburg gained him a com-

mission as rear admiral. In 1865, while in command of the North Atlantic blockading squadron, he, with General Terry, captured Fort Fisher. After the war he served efficiently four years as superintendent of the Naval Academy at Annapolis.



In 1866 he became vice-admiral, and on the death of Farragut, in 1870, rose to the highest naval rank, that of admiral.

PORTER, GENE STRATTON (1868-1924), a popular American writer, was born in Wabash, Indiana. Her first professional work was with *Recreation*, for which she contributed photographic studies of natural history subjects. She was later on the staff of *Outing*. Her first stories appeared in magazines. Her best known works are: *The Song of the Cardinal*, *Freckles*, *What I Have Done with Birds*, *At the Foot of the Rainbow*, *Birds of the Bible*, *A Girl of the Lumberlost*, *Music of the Wild*, *The Harvester*, *Laddie*, *Her Father's Daughter*, and *Tales You Won't Believe*, stories of nature experiences. She declared her chief object in writing was "to draw the readers into closer touch with Nature and the Almighty."

PORTER, JANE (1776-1850), an English novelist. Her most important novels were *Thaddeus of Warsaw* and *Scottish Chiefs*, the latter the best historical romance written up to the time of Scott.

PORTER, WILLIAM SIDNEY (1867-1910), one of the most popular of American short-story writers, universally known to the reading public as "O. Henry." He was distinctly American. His picturesque descriptions and characterizations of New York types, won for him an enviable following.

He was born in Greensboro, N. C. Before beginning his literary career as a reporter on the Houston (Tex.) *Post*, he "knocked around" the South and Southwest, gathering local color which later flavored his "O. Henry" tales. Later he was buffeted among life's flotsam and jetsam in a trip to Central America. Upon his return to the United States he became involved in a bank embezzlement at Greensboro, for which he served a jail sentence, although his innocence was subsequently proven. During his incar-

ceration he wrote a number of his most famous short stories. He finally settled in New York, where he died. His best known collections include *The Trimmed Lamp*, *Sizes and Sevens*, *The Voice of the City* and *Cabbages and Kings*. An edition of his collected Works also has been published. Many of the "O. Henry" tales have been successfully dramatized for the moving picture stage. In 1919 a great hotel in his native city was named the O. Henry Hotel, and the second floor was set aside as a memorial to him.

PORT HOPE, ONT., in Durham county, on Lake Ontario, the Ganeraska River, and the Canadian National and Canadian Pacific railways. It has a fine harbor and trade in lumber, grain and dairy products. There are manufactories of woolen goods, flour, steel, porcelain and enamel ware, leather belting, plows, etc. The canning of fruits and vegetables is also important. It is the seat of Trinity College School, in affiliation with Trinity University, Toronto. Population, 1931, 4,723.

PORT HU'RON, MICH., eleventh city in size in the state and the county seat of Saint Clair County, sixty miles northeast of Detroit, on Lake Huron, at the head of the Saint Clair River and at the mouth of the Black River, and on the Pere Marquette, the Port Huron Southern and two lines of the Grand Trunk railroad. An interurban line runs to Detroit. The city is built on both sides of the Black River, and there is a railroad tunnel under the Saint Clair River to Sarnia, Canada. Port Huron has connection by boat with the other ports on the Great Lakes and conducts a large trade. There are several dry docks and shipbuilding yards, engine and thresher works, railroad shops, foundries and other factories.

The climate, scenery, mineral springs and fishing facilities have made the place a popular summer resort. It has a Carnegie Library, a normal school, Saint Stephen's Academy, a law library, a business college, four banks, a hospital and four public parks. Other prominent structures are a Federal building, a city hall, a courthouse, Maccabee Temple and a large convention hall. The place was settled by a French colony in 1790, and was known by various names until its organization as the village of Port Huron in 1849; it was chartered as a city in 1857. Population, 1920, 25,944, in 1930, 31,361, a gain of 21 per cent.

PORTLAND, ME., the state's largest city and the county seat of Cumberland County, sixty-three miles nearly south of Augusta, on Caseo Bay and on the Maine Central, the Boston & Maine and the Grand Trunk railroads. The airport is one mile from the Union Station. The streets are regularly laid out, and there are about 115 acres of parks, containing a soldiers' monument and a fine bronze statue of Longfellow, whose birthplace was here.

The city has a public library and that of the Maine Historical Society, public kindergarten and manual training schools, Westbrook Seminary and Junior College and parochial schools. The charitable institutions include the Maine General Hospital, Maine Eye and Ear Infirmary, the United States Marine Hospital and homes for orphans and for aged men and aged women. Other prominent buildings are the million-dollar city hall, an armory, a customhouse, a postoffice, Cathedral of the Immaculate Conception, Saint Luke's Cathedral, Union Depot, Mechanics' Hall, several large hotels, an exposition building seating 4,500 and a large county building. In the city hall is a \$60,000 organ, the gift of Cyrus H. K. Curtis, the Philadelphia publisher, who was born here.

Portland has a deep harbor and has been an important trading center since colonial times. It has an extensive coastwise trade, and several foreign steamship lines make connection here. The port has large warehouses and grain elevators and is a very important shipping port for Canada. The 200 industrial establishments of Portland include locomotives and car works, rolling mills, hat factories, boot and shoe shops.

The place was settled in 1632 and was known by the Indian name of Machigonne. It was then successively called Stogomer, Casco Neck and Falmouth. In 1676 the village was destroyed by Indians, and after other settlers had come, the place was again ravaged in 1690. In 1715 a settlement was made which proved permanent. It was incorporated as the town of Portland in 1786, and was chartered as a city in 1832. The council-manager form of government has proved satisfactory. Population, 1900, 50,145; 1920, 69,272; in 1930, 70,810, a gain of 2.2 per cent.

PORTLAND, ORE., the metropolis of the state, is delightfully situated near the Columbia River and on both sides of the Willamette River, 100 miles by water from the

Pacific Ocean. It is 198 miles south of Seattle and 720 miles north of San Francisco. The city is served by the Great Northern, the Northern Pacific, the Southern Pacific, the Spokane, Portland & Seattle and the Union Pacific railroads. There are four airports in the vicinity of the city. Steamship lines operating out of Portland number 60.

Improved highways extend in all directions. Portland is the center of one of the best paved highway systems in America. The Pacific Highway runs north and south from California to British Columbia, the famous Columbia River Highway is paved 100 miles east through the wonderful Columbia River Gorge, and 120 miles west to Astoria and Seaside, terminus of Old Oregon Trail. Moreover, every important city within a radius of 120 miles is also reached by a paved road.

Commerce and Industry. The city is most fortunately located both for commercial and for residential purposes. It is a Pacific Northwest center for both continental and coastwise traffic. The principal industries of its 800 plants are lumber, wood products, flour and cereals, wool and textiles, garments, fruit and vegetable canning, and machinery. But transportation of commodities is extremely important, for their annual value amounts to a third of a billion dollars. The harbor is 35 feet deep with a shore line of 30 miles and the docks extend for six and a half miles with their massive grain elevators and huge drydocks. The freight rates by water through the Panama Canal enable shippers to compete successfully with the goods shipped to the Gulf and Atlantic coast markets by rail. Portland leads the country in the exportation of wheat and lumber; apples, flour and wool are very large items. The extent and rapid development of industries and traffic have made Portland one of the wealthiest cities of its size in the United States.

Institutions and Recreation. The principal buildings and institutions of the city are Reed College, North Pacific College, Columbia (a junior college), the municipal auditorium, the public library, Shriners' Hospital for Crippled Children and fourteen other hospitals, and the University of Oregon Medical School.

Recreation is provided for in the 55 parks, 24 playgrounds, the stadium with a seating capacity of 32,000, two large bathing beach-

es and 20 golf courses. Fishing, mountain climbing and motoring afford strong attractions to both residents and visitors: it is only a ninety-minute drive to the snow fields of Mount Hood, while trout fishing can be had a half mile from the city and some of the best trout streams of the world can be reached in three hours.

West of the business section of the city are Council Crest, Portland Heights and Terwilliger Boulevard, from which may be obtained most delightful views of the surrounding country. Rising abruptly from one of the main streets these hills reach heights of 750 feet; upon them are great firs, oaks and cedars. Here are erected some of the most palatial homes. Three snow-capped peaks are visible—Mount Hood, Mount Saint Helens and Mount Adams.

The climate is also most kindly, with cool summers and mild winters. Life in the city is commended moreover because of freedom from the smoke nuisance and from slums. Especially attractive are the well kept gardens of Portland and the beautiful lawns with their wealth of flowers and shrubbery. The rose season extends from early spring until late December and the world famous Rose festival affords a dazzling pageant each year.

History. Francis W. Pettygrove of Maine and Amos L. Lovejoy of Massachusetts founded Portland in 1845. They held a joint claim for land, the choice of name was between Boston and Portland; in tossing a coin to determine the choice Pettygrove won.

The city was chartered in 1851. Despite a destructive fire in 1873 the city grew rapidly to a place of 17,577 in 1880. The Northern Pacific railroad reached the city in 1883. During a ten-year period following the World War the traffic of the port more than doubled. The progress of the city was celebrated in the centennial exposition in 1905 commemorating the expeditions of Lewis and Clark. Population, 1930, 201,815.

PORT OF ENTRY, any point at which a government allows foreign goods to be unloaded and released to domestic trade. At each of such ports there is a customhouse through which all imported goods must pass; and anyone who attempts to smuggle dutiable merchandise into a country through other channels is guilty of fraud and liable to fine and imprisonment. Formerly all ports of entry were seaports or towns on the bound-

aries of countries, but since shipping in bond has become customary, any inland city may by the customs administration be designated a port of entry.

PORT OF SPAIN, TRINIDAD, capital city of that British West Indian island and a port from which much of Northern South America's products are shipped. It is particularly important as a shipping point for asphalt. It is one of the best towns in the entire West Indies. Population, 1931, 70,641.



PORTO RICO, (officially PUERTO Rico), an island possession of the United States and one of the most beautiful of the West Indies, is 1,000 miles east by south of Key West, and 1,500 miles southeast of New York. The island is about 100 miles long and averages a little over thirty miles in width. Its area, including a number of small islands along the coast, is 3,606 square miles, or about three-

fourths that of Connecticut, and nearly three times that of Rhode Island, the smallest state in the Union.

The People. Spaniards and other whites constitute about three-fourths of the inhabitants; the remainder are negroes and people of mixed negro and Spanish blood, descendants of the negroes who were brought to the island as slaves. The majority of the whites are Spaniards, but since the island became a part of the United States, many American business men have acquired interests there. In 1920 the population was 1,299,809; in 1930 the United States census figures give 1,543,913. Nearly all the inhabitants are Roman Catholics.

There are no large cities. San Juan, the capital, with a population of about 114,715, is the largest. Ponce, the city next in size, has 53,430. Mayaguez with 37,060, and Caguas with 19,791, are the only other cities having populations exceeding 15,000.

Surface and Drainage. A range of low mountains or hills extends across the island in an east and west direction. These have an altitude of from 2,000 to 3,000 feet, and the highest peak, in the northeastern part of the island, reaches 3,609 feet. From this

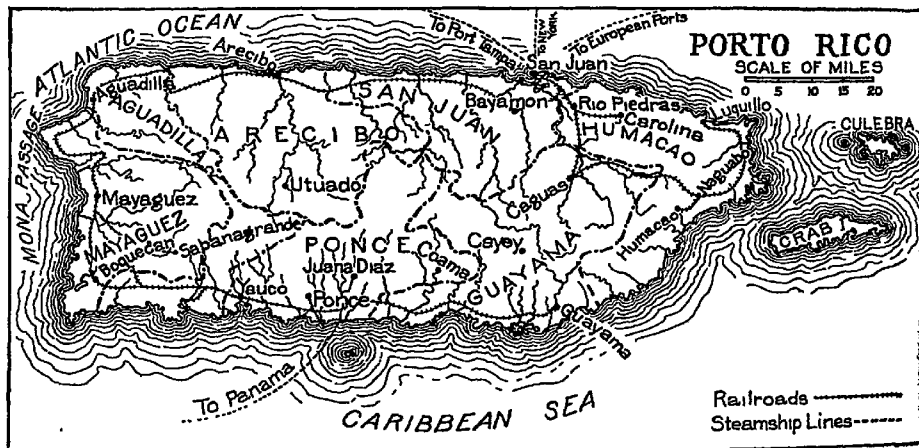
range of hills the land slopes north and south. Along the coast are stretches of nearly level low land, but the interior of the island is elevated and hilly.

The rivers are all short and rapid. While a few of them have estuaries which serve as harbors, none of them is navigable for any distance, though all are more or less valuable for water power. Those of importance flowing to the north coast are the Bayamon, the Loiza, the La Plata, the Manati and the Tanama. The Blanco flows to the western coast, and the Portugues is the most important stream flowing to the south. There are numerous lagoons along the coast, and there are a few small lakes in the interior.

Climate. Porto Rico is within the region of the northeast trade winds, which modify its temperature so that it does not suffer from the intense heat of some regions within the same latitude. The climate of the high land in the interior is also more salubrious than that along the coasts. The thermometer seldom rises above 100° in the hottest months or falls below 50° in the coldest. The mean

and tile. An excellent quality of limestone occurs in large quantities, and it is generally used in the construction of public buildings and the residences of the more wealthy inhabitants. Boulders are also used to some extent in the construction of dwellings. An excellent quality of marble is found, and there are large deposits of gypsum, which is used in stucco work and as fertilizer. On the south coast are extensive deposits of phosphates, and a considerable phosphate industry has been developed on Mona Island. Near Ponce are a number of caves filled with deposits of guano. Enough salt for home consumption is obtained from deposits at Coamo, Guanica and Sierra de Pinones de Cabo Rojo. Some lignite is found, and since the discovery of the island by Columbus, gold in small quantities has been washed from the beds of streams. Ores of copper and iron of good quality are found, but no mining of metals on a large scale has yet been attempted.

Agriculture. Agriculture is the great basic industry of Porto Rico and constitutes



annual temperature at San Juan is about 80° . The rainfall varies, averaging 60 inches at San Juan and in the interior highlands, and 100 inches or more on the northeast coast. The north side of the island, because of the prevailing winds, receives more rain than the south. Disastrous hurricanes have visited the island, causing great damage to crops, but nature quickly overcomes such handicaps.

Mineral Resources. The island has an abundance of clay suitable for making brick

the source of livelihood of more than four-fifths of its people. The diversity and general upbuilding of agriculture is the fundamental economic task of both the people and the government of the island.

Sugar, coffee and tobacco are the leading crops in quantity and in value. These are followed by citrus fruits. Bananas, pineapples, plantains, oranges, grapefruit, coconuts, and beans are among the leading exports.

Practically all the tillable land is under cultivation. According to the United States Census Bureau, out of an area of 2,198,400 acres over 2,085,162 are in farm lands, and 1,570,304 acres are in improved land. The farms are small, having an average size of 35.7 acres. Previous to the occupation of the island by the United States, the most primitive methods and antiquated implements were employed. But an agricultural commission has been organized, and the United States Department of Agriculture is also giving the farmers of Porto Rico the benefit of its wide experience and exhaustless resources. Under these influences rapid progress is being made.

Manufactures. The manufactures are directly connected with agriculture. In order of their importance they are the manufacture of sugar, molasses, cigars and cigarettes, and the cleansing and polishing of coffee. Minor manufactures include the making of hats and straw goods, and the manufacture of boots and shoes. Machine shops and carpenter shops confine their work chiefly to making repairs. San Juan and Ponce are the centers of the tobacco industry. Manufacturing industries are being introduced and supported by American business men, as rapidly as the business conditions of the island seem to warrant.

Transportation and Communication. There are over 1,300 miles of macadamized roads in the island, and the country roads are being rapidly improved. Funds for these roads are derived from bond issues, and annual government appropriations for maintenance. There are about 300 miles of railway in operation. This is a portion of a belt line which is projected to encircle the island; the line already completed has numerous branches extending to industrial centers. The postal service is conducted by the United States.

Government. In 1917 Congress passed an act giving Porto Ricans full rights as citizens of the United States, though such citizenship was not obligatory. The governor is appointed by the President of the United States. There are departments of justice, finance, interior, education, agriculture, and labor and health, and the heads of these departments constitute the governor's council. The attorney-general and commissioner of education are appointed by the President, and the heads of the other departments by

the governor, with the advice and consent of the senate of Porto Rico.

The legislature consists of a senate of nineteen members and a house of representatives of thirty-nine members, all elected by the qualified voters for a term of four years. The legislature elects a Resident Commissioner to the United States Congress. All laws passed by the legislature are subject to the approval of the Governor, and of Congress and of the President, if vetoed by the Governor.

Proposal for Independence. In 1936 a resolution was introduced in the United States Senate providing for independence for Porto Rico following a five-year preparatory period. It focussed attention on an unhappy political situation. One faction among the islanders seeks independence at an early date; another petitions that the island shall be made a state of the American Union; a third prefers continuation of the existing colonial status.

Education. A system of elementary schools on the American plan was organized immediately after the United States took possession of the island, and education was made compulsory. Since that time remarkable progress has been made. Special attention has been given to raising the standard of qualifications for teachers, to grading the pupils and making the course of study more practical. There are over 4,500 elementary schools in the island. They are taught by native and continental American teachers, more than half of whom are women. Above the age of 10, 40 per cent of the people are illiterate. The University of Porto Rico, at Rio Piedras, near San Juan, has normal courses, and many native teachers obtain their preparation there.

History. Porto Rico was visited by Columbus on his second voyage in 1493 and was named San Juan Bautista. In 1508 Ponce de Leon landed on the island, and two years later he began its conquest. The Spaniards soon subdued and enslaved the natives, and within the next few decades, under their rigorous rule, most of the natives died. Negroes were then imported for slaves. With the exception of a few decades during European wars, the island remained in peaceful possession of Spain, but its development was slow, owing to the colonial policy of that country. Several minor attempts at revolt were made, and one of these in 1867 caused some anxiety, but was speedily suppressed.

Two years later Porto Rico was made a province of Spain and allowed representation in the national parliament. After eleven years, however, this favor was withdrawn. During the Spanish-American War the island was occupied by the United States forces under Admiral Sampson and General Miles on July 20, 1898. At the Treaty of Paris, Porto Rico was surrendered to the United States. In consideration of the surrender of Porto Rico and the Philippines to the United States the latter country paid Spain \$20,000,000.

PORT SAID, *sah eed'*, EGYPT, is situated at the Mediterranean entrance of the Suez Canal. It has a large, deep harbor, which is well protected by piers and by a breakwater. The importance of the town rests in the fact that it is at the entrance of the canal, and because of this it has considerable shipping business. At the entrance of the harbor is a statue of Ferdinand De Lesseps, the engineer of the canal, a lighthouse and extensive docks. Population, 1927, including environs, 104,603. See SUEZ CANAL.

PORTSMOUTH, *ports'muth*, ENGLAND, the chief naval station of Great Britain, situated at the southwest extremity of Portsea Island, seventy-four miles southwest of London and eighteen miles southeast of Southampton. The harbor is four miles long and nearly as wide and is large enough to accommodate the entire British navy. The town and harbor are protected by extensive fortifications, considered the best in Great Britain. The buildings and industries are comparatively unimportant. The city was the birthplace of Charles Dickens, George Meredith and Walter Besant. Population, 1931, 249,288.

PORTSMOUTH, N. H., one of the county seats of Rockingham County (Exeter being the other), fifty-seven miles nearly north of Boston, on the Boston & Maine railroad and bus service lines, and on the navigable Piscataqua River, three miles from the Atlantic Ocean. It is the only seaport in the state and has a large, deep harbor and a considerable coasting trade. The industrial establishments include a large shoe factory, gypsum works and manufactures of shoe buttons, button-sewing machines, locks and other goods. It has one of the largest button factories in the world.

Portsmouth is of historic interest and still contains several colonial mansions. The Isles of Shoals and many other places in the

vicinity are popular summer resorts. The Portsmouth navy yard is on an island formerly known as Fernald's Island, now within the limits of the township of Kittery, Maine. The city has three parks, a public library and the Athenaeum, containing a museum and a large library, and a Federal building. Other buildings of note are the old residences of governors Wentworth and Langdon, the Saint John's Church and the Federal building.

The place was settled in 1623 and was known for many years as Strawberry Bank. It was incorporated as Portsmouth in 1653, and was chartered as a city in 1849. After the organization of New Hampshire, in 1779, it was the capital of the state until 1807. The United States District Court of New Hampshire now holds its sessions alternately at Concord and Portsmouth. In the summer of 1905 the treaty which closed the Russo-Japanese War was negotiated here. Population, 1920, 13,569; in 1930, 14,495, a gain of 67 per cent.

PORTSMOUTH, OHIO, the county seat of Scioto County, 100 miles south of Columbus, on the Ohio River, at the mouth of the Scioto and at the terminus of the Ohio Canal, and on the Baltimore & Ohio, Norfolk & Western and Chesapeake & Ohio railroads. The city has Raven Rock airport. There are also several steamship lines on the river. The city is in a fertile agricultural region, with considerable mineral wealth, and it has become an important industrial center. It contains a Carnegie Library, a hospital, a Masonic Temple and several charitable homes. There are three parks. The Scioto valley contains interesting remains of the Mound Builders. The various manufactures include steel, shoes, brick, cars, furniture, veneering, foundry and machine shop products, and paper boxes. Population, 1920, 33,011, in 1930, 42,560, a gain of 29 per cent.

PORTSMOUTH, VA., the county seat of Norfolk County, on the Elizabeth River, opposite Norfolk, with which it is connected by a ferry. It is on the Atlantic Coast Line, the Norfolk & Western, the Pennsylvania, the Norfolk Southern, the Virginian, Seaboard Air Line, the Chesapeake & Ohio, and the Southern railroads. The city is a residence place for Norfolk business men. It contains a United States navy yard, a naval hospital and a city park. The largest dry-dock in the United States is located at the navy yard; its length is 1,022 feet, it has

a depth of over forty feet, and cost \$4,000,000. There are also other drydocks. There are also extensive steel shipbuilding yards, hosiery factories, smelting works, veneer works, and railroad shops. The city has a naval training station, a naval magazine and a naval hospital. There is a large trade in lumber, cotton, naval stores, fruits and vegetables. The place was settled in 1752 and was chartered as a city in 1858. The Trinity Episcopal Church was first built in 1762 and is of historic interest. On the present site of the navy yard, the British government operated shipyards before the Revolution. Population, 1920, 54,387, in 1930, 45,704.



PORTUGAL, a republic of Europe, occupying the extreme southwestern part of the continent, is bounded on the north and east by Spain and on the west and south by the Atlantic Ocean. Its greatest length from north to south is 350 miles, and its average width is 100 miles. With the Azores and Madeira islands, which are usually considered a part of the republic, the area is 35,490 square miles, or a little more than that of Indiana.

The People. Portugal was originally colonized by Phoenicians, Carthaginians, Greeks and Romans, and later by Gothic and Moorish invaders. All these were the ancestors of the Portuguese, who are short of stature and have dark hair and eyes. While resembling the Spaniards in outward appearance, the Portuguese differ from them in temperament. They lack the artistic and aesthetic temperament of the other nations of Southern Europe, and are much more serious and sober-minded than the Spaniards. Although they dress in gay clothing, the Portuguese are a busy and industrious people. The women perform much of the heavy labor, and carry heavy burdens on their heads. Many French, English and Dutch have come into the country from the colonies, but emigration is far in excess of immigration. The population in 1930 was 6,825,883.

The Portuguese language closely resembles the Spanish, differing from it chiefly in accent and pronunciation. Cervantes charac-

terized Portuguese as "Castilian without bones." Previous to the formation of the republic in 1910 Roman Catholicism was the religion of the state, but the Church and state were separated under the new government, and there is no state religion. There are about 5,000,000 Roman Catholics and 40,000 adherents of other creeds in the country.

Surface and Drainage. Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast line, of great length in proportion to the extent of the whole surface, runs in a general south-south-west direction till it reaches Cape Saint Vincent, where it suddenly turns east. The coast is occasionally bold and rises to a great height; but the far greater part is low and marshy, and is not infrequently lined by sands and reefs, which make navigation dangerous. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins. Of the rivers, the two most important, both navigable, are the Douro, in the north, and the Tagus, flowing south-west. The loftiest range is the Serra da Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7,524 feet.

Climate. The climate of Portugal is temperate and equable, the mean yearly temperature being 61°, with a difference of only 20° during the year. The country was formerly a popular winter resort, but lack of improvements and sanitation caused tourists to seek more favorable localities in Southern France and Italy. The equable temperature is due largely to the influence of the sea and to the heavy rainfall, which is quite evenly distributed throughout the year, although more rain falls in November, December and January than in other months.

Agriculture. The mild and equable climate adapts the country to agriculture, and almost any crop common to central and southern Europe can be grown successfully. Fruits are grown throughout the country, but the warmer districts in the south are noted for the production of oranges, lemons and olives. The mulberry is also cultivated on a large scale, but the cultivation of grapes and the manufacture of wines is the most important branch of the fruit industry. Notwithstanding the natural advantages, agri-

culture is in a deplorable condition, and in ordinary years the country fails to raise enough cereals to meet the demands of the population. Wheat, barley, oats, flax and hemp are cultivated on the higher land, while rice is grown on the lowlands. The raising of live stock is an important branch of agriculture, and a considerable number of horses, cattle, goats and swine are exported. The culture of the silkworm is also important.

Manufactures. The manufactures are comparatively unimportant. The leading centers are Oporto and Lisbon. The most important industries include shipbuilding and the manufacture of cotton and woolen goods, linen, silk, leather, spirits, porcelain, tobacco, hats, ironware, shoes and soap.

Transportation and Commerce. The large rivers are navigable and these form the chief highways to the ocean. They are dotted with bright-hued sails of many small boats, in which the products of the farms are shipped to the large trade centers. The country has over 1,500 miles of railways, which connect all the large cities and towns of Portugal and also with the chief commercial centers in Spain. There are a number of good harbors, the most important being those of Lisbon, Oporto and Setubal.

The exports consist of wine, cork, copper ore, olive oil, fruits and live stock, while the imports include coal, raw cotton, fish and manufactured articles such as cannot be readily produced in the country. The foreign trade is chiefly with Great Britain, Germany, Brazil and the United States.

Literature. Portuguese literature began with the songs of the troubadours (which see), which celebrated the victories over the Moors and barbarians. It reached its height in the sixteenth century in the writings of Camoes. His epic *Os Lusíadas* is considered the greatest poem in Portuguese literature. The writings of the twelfth and thirteenth centuries were mostly on theological subjects, and were in Latin. The fourteenth and fifteenth centuries contained little of permanent value. In the nineteenth century Almeida Garrett, the poet, and Herculano, the historian, were the most influential writers, with possibly the exception of Guerra Junqueiro, the modern poet of Portugal, whose poems are thought by some to be the chief influence leading to the overthrow of the monarchy.

Education. Primary education is compulsory, and since the decree of the provisional

government in 1911 the law has been rigorously enforced. There are over 5,500 elementary schools and thirty-one secondary schools, whose teachers are trained in the normal departments attached to the universities at Lisbon and Coimbra. These universities and that at Oporto offer courses similar to those of other European universities. There is a technical school at Lisbon. Colleges for music are located at Lisbon and Oporto, and there is a military and a naval academy at Lisbon. Previous to the overthrow of the monarchy, education was in a backward state, and, notwithstanding the efforts now being made to educate the rising generation, the percentage of illiteracy is large; it was 54.7 per cent in 1920, but in fifteen years reduced to about 45 per cent.

Government. Portugal has been an independent state since the twelfth century. In October, 1910, a republic was declared. A provisional government was organized which continued until the adoption of a new constitution in August, 1911. The Parliament consisted of two chambers, the upper of 71 members, the lower of 163 members, the first were elected by the municipal councils, the second by popular vote. In 1933 the President was put out of office through a dictatorship successfully established, and a new Constitution was adopted. The legislative department now has only one chamber of ninety members, elected by direct suffrage. The office of President is retained, but filled temporarily by the dictator. In 1934 the dictatorship had achieved a stable government, and parliamentary rule was restored.

Colonies. The foreign possessions of Portugal, in Africa and Asia, are as follows:

COLONIAL POSSESSIONS	AREA IN SQ. MI.	POPULATION
IN AFRICA		
Cape Verde Islands	1,557	150,553
Guinea	13,944	364,929
Principe and Saint Thomas'		
Islands	372	59,060
Angola	487,768	3,098,281
Mozambique	299,973	4,028,746
IN ASIA		
In India Goa, etc	1,637	579,969
Timor	7,330	474,363
In China Macao, etc	5	157,175
	812,606	8,913,076

Cities. The chief cities are Lisbon, the capital; Oporto, Setubal, Faro, Figueira and Vianna.

History. The earliest colonies in Portugal were founded by the Phoenicians and

Carthaginians. These were followed by the Greeks, who settled at the mouth of the Tagus. Later Latin settlements were made, and the sway of the Roman empire was extended over the country. In the fifth century, the entire peninsula was overrun by the Visigoths, and in the eighth century it was conquered by the Moors. The rule of the Moorish Caliphs was wise and for two centuries the country prospered. As the final result of the prolonged struggle between the Moors and the Christians for control of the country, Ferdinand the Great conquered the Moors, and his son, Alfonso IV of Spain, in 1095 made Henry of Burgundy the first count of Portugal. At this date the history of Portugal begins.

The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus. Henry's son, Alfonso I (1128-1185), defeated the king of Castile and made himself independent, gained the brilliant victory of Ourique over the Moors and was saluted on the field as king of Portugal. The Cortes confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. The succeeding reigns from Sancho I (1185-1211) to Denis, (1279-1325) are noteworthy chiefly for the conflict with the pope, who several times put the kingdom under interdict. Denis's wise encouragement of commerce, agriculture, manufactures and navigation laid the foundation of the future greatness of Portugal.

Denis was succeeded by Alfonso IV, who in turn was succeeded by his son Pedro. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. John I, the natural son of Pedro, was saluted king by the estates, and he proved an excellent sovereign. In 1415 he took Ceuta, on the African coast, and this was the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. The reigns of his son Edward (1433-1438) and his grandson Alfonso V (1438-1481) were less brilliant than that of John I; but the latter was almost surpassed by that of John II (1481-1495), perhaps the ablest of Portugal's rulers. In his reign began a violent struggle with the nobility, whose power had become very great under his indulgent predecessors. The expe-

ditions of discovery were continued; Bartholomew Diaz doubled the Cape of Good Hope, Vasco da Gama reached India, and Brazil was taken possession of for Portugal by Cabral.

While these great events were still in progress, John II was succeeded by his cousin Emmanuel (1495-1521), under whom the power of Portugal reached its height. In the reign of John III, son of Emmanuel (1521-1557), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth, through the importation of the precious metals and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced, and the Jews, who were among the wealthiest and most industrious citizens of the country, were driven out. Sebastian, the grandson of John III, lost his life in a battle against the Moors and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to throw it off; but the power of Philip was too great to be shaken. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, duke of Braganza, reigned till 1656, when he was succeeded by Alfonso VI. Pedro II, who deposed Alfonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged.

During the long reign of John V (1706-1750) some vigor was exerted in regard to foreign relations, while under his son and successor, Joseph I (1750-1777), the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, John, the crown prince, was declared regent. His connection with England involved him in war with Napoleon, Portugal was occupied by a French force under Junot, and the royal family fled to Brazil.

In 1808 a British force was landed under Wellington, and after some hard fighting the decisive Battle of Vimeira took place, which

was followed by the Convention of Cintra and the evacuation of the country by the French (see PENINSULAR WAR). The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with disfavor by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king was invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. On the death of John, the Brazilian emperor Pedro became king of Portugal, and he granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was intrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a revolution in his favor placed him on the throne. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe he succeeded in overthrowing Dom Miguel and restoring the crown to Maria, but died himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria died in 1853. Her husband, Ferdinand of Coburg, became regent for his son, Pedro V, who began to reign in 1855. Pedro died in 1861 and was succeeded by his son, Carlos I, who, with the crown prince, was assassinated February 1, 1908. The second son, Manuel II, reigned until 1910, when he was deposed and a republic established.

Upon the overthrow of the monarchy, Manuel II went to England, where he died in exile in 1932. But there was left in the country a strong monarchist party, and this party has harassed the new government ever since its formation.

Antagonism between the Ministry and the army led to a Cabinet crisis in 1915, which caused the resignation of the existing Cab-

inet and the formation of a new government. This government decided to postpone the general election until the census could be revised. This decision was followed by a revolution, and an attempt to establish the republic of Northern Portugal. The revolution spread rapidly and resulted in the resignation of President Arriaga and the election of Theophilo Braga, President of the provisional government in 1910, for the remainder of his term. At the regular election in August, Bernardino Machado was chosen President.

A military revolution occurred in 1916, led by those who did not believe the government was fulfilling Portugal's treaty obligations with Great Britain relating to the World War. Another revolution in December 1917 overthrew the Machado government, and made Dr. Sidonia Paes provisional President. Between the revolution of 1910 and the year 1935 forty-five Cabinets succeeded one another in attempts to stabilize the situation.

Portugal in the World War. In accordance with a treaty with Great Britain, Portugal was bound to furnish 10,000 troops for war whenever called upon. In 1914 a Portuguese army attacked the German troops in Africa to protect the Portuguese colonies there. In 1916 the government confiscated forty-four German merchant ships which had been interned in Portuguese harbors. Germany demanded a release of the ships, but Portugal gave no heed to the demand, and on March 8 Germany declared war on the republic, making Portugal the thirteenth nation to enter the conflict.

Related Articles. Consult the following titles for additional information:

Angola	Portuguese East Africa
Lisbon	Portuguese Guinea
Oporto	World War

PORTUGUESE, *por'tu geez*, **EAST AFRICA**, or **MOZAMBIQUE**, *mo zam beek'*, a Portuguese colony extending along the coast in the southeastern part of Africa, between what was formerly German East Africa and Zululand. The western boundary is formed by British Central Africa, Rhodesia and the Transvaal. The region is crossed by the Zambezi River, which divides it into two nearly equal sections. The area is 299,973 square miles. Most of the surface is low and swampy along the coast and rises to a higher level in the interior, which is covered with forests. The Namuli Mountains, with an altitude of 7,500 feet, and the Serra da Goron-

gaza are the highest elevations. Most of the region has an unhealthy climate for Europeans. The native inhabitants are Bantus, and they are generally engaged in agriculture, raising large crops of corn, tobacco, palm nuts, rubber, indigo, coffee and sugar. Some gold and coal are obtained. Lourenço Marquez, the capital, is connected with Pretoria by railway, and in all there are about 300 miles of railway in the colony. The other important towns are Mozambique, Quilimane, Sofala and Beira. Population, 1934, 4,028,750

PORTUGUESE GUINEA, *gm'e*, a small Portuguese colony in Northwestern Africa, between Senegambia and the Atlantic Ocean. It includes a small coast territory and the Bissagos Islands. The area is about 14,000 square miles, and the capital is Bulama. Population, 365,000.

PORT WINE, a full-flavored red wine, first made in the upper valley of the Douro, Portugal, and named from Oporto, the chief port of shipment. The grapes, which have a strong flavor, were once trodden under foot but now pressed; the juice is then put in vats to ferment. Alcohol is added from time to time, and the wine is then placed in storage and left four years to mature. A similar non-sparkling red wine made in California is named domestic port. See **WINE**.

PO'SEN, before and during the World War capital of the Prussian province of Posen. By the Treaty of Versailles (1919) the province was awarded to the newly-constituted republic of Poland (which see), since which it has been called **POZNAN**. The city of Poznan is situated on the Warthe River, 150 miles east of Berlin. It is surrounded by two lines of forts, is built with considerable regularity and has, in general, fine wide streets and numerous squares, or open spaces. The most noteworthy public buildings are the Gothic cathedral, built in the eighteenth century; the parish church; the Church of Saint Mary; the Raczyński palace, which contains a large library, the townhall, and the royal palace. The manufactures of the city consist chiefly of furniture, agricultural implements and flour, and there are numerous distilleries. Population, 1931, 246,574

POSTAGE STAMPS. The postage stamp was invented by Sir Rowland Hill of England, in 1840. Previous to its use postage on letters and other mail was generally paid upon delivery of the article, and the incon-

venience to the postoffice department of collecting so many small sums became so great that some means of relief was found necessary. In this crisis the postage stamp was devised by Sir Rowland Hill, the Postmaster-General of England. Such was its success in England that it was soon adopted by the other European countries.

The United States government adopted the use of postage stamps in 1847. But previous to this date the government had allowed some postmasters and corporations to issue stamps on their own account as an experiment. This test was so successful that the government soon took over the work and made the issuing of postage stamps a government monopoly. Still their use was optional, and they did not come into general use until 1855, when the government made pre-payment of postage compulsory. There are two kinds—the adhesive stamp which we stick on letters and parcels, and the embossed stamp on stamped envelopes and newspaper wrappers.

Manufacture. The designs for postage stamps are made by the best artists the country can command. Several designs are usually offered by competing artists, and from them a commission selects the one considered the most desirable. The stamps are printed from steel-engraved plates on a press made especially for the purpose. As the paper passes through the press, it is printed and perforated, so that the stamps can be easily separated. The largest sheets are cut into sheets of 100 stamps each, before being distributed to postoffices.

POSTAL SAVINGS BANKS. See **SAVINGS BANKS**

POSTAL UNION, **INTERNATIONAL**, a union for the purpose of establishing uniform postal regulations between nations and for concerted effort in handling the mails. Previous to the formation of the postal union in 1874, a number of postal treaties had been made, but they differed widely as to the details of handling international mail, and there was a lack of uniformity in rates of postage between different countries. The first postal union was formed by the independent Germanic states in 1850, and the idea of the present union was borrowed from that. The agreement is in the form of an international treaty, and was signed by representatives of all the nations participating. At present it includes the civilized world. A con-

gress of delegates of the nations interested meets every five years, to consider means of improving the postal service of the world. Each nation has one vote. The national headquarters are at Berne, Switzerland. The union has established uniform rates of postage for the exchange of mail between all its members.

POSTOFFICE DEPARTMENT, a department of government charged with the conveyance and delivery of letters, newspapers, magazines and all merchandise which the government considers legally mailable. The United States maintains the largest post-office department in the world. There are about 46,500 postoffices and about 355,000 employees, who handle one-third of the mail of the civilized world. The service handles not far from 3,000,000 letters every hour of the day and night; the number of pieces of mail handled in the United States equals all the pieces handled in Great Britain, France, Germany and Russia. The entire system is under the control of the Postmaster-General, who is a member of the President's Cabinet.

History and Development. The beginnings of a postal service in the United States date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established "a post to goe monthly from New York to Boston;" a general postoffice was established in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was appointed in 1692; at about the same time, a monopoly was established, which included, also, the transport of travelers, and a tariff was fixed. The system, however, proved a failure until 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded \$15,000.

In 1789, when the Postoffice Department was transferred to the new Federal government, the number of offices in the thirteen states was only about seventy-five. The remarkable progress since the organization of the government is shown not only in the increase in the number of postoffices from seventy-five in 1790 to more than 76,600 in 1900 (reduced to about 46,500 by 1936), but also in the expansion of the service and in the introduction of improved methods, and new lines of service for increasing the use-

fulness of the department. Chief among these are the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847); of stamped envelopes (1852); of the system of registering letters (1855); the establishment of the free delivery system and of the traveling post-office system (1863); the introduction of the money order system (1864); the introduction of postal cards (1873); stamped newspaper wrappers and envelopes bearing requests for the return of the enclosed letter to the writer, in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal money orders" (1883); the establishment of a special delivery system (1885), under which letters bearing an extra ten-cent stamp are delivered by special messengers immediately on arrival; the beginning of the rural free delivery system (1896), by which mail is delivered to rural homes by carrier, and the establishment of the parcel post (1913).

The Railway Postoffice. The railway postoffice, founded by George B. Armstrong, has been called the "backbone of the American postal system." In 1864 Mr. Armstrong induced some railroads to change the construction of their mail cars, so that mail could be sorted on the train. By this plan several hours were saved in the delivery of mail, for when a train reached its destination all mail going beyond that point was sorted and placed in pouches ready for immediate delivery to the next outbound train. The clerks on these traveling postoffices are thoroughly acquainted with the location of all postoffices and the railway connections over a wide range of country through which they travel, and they work with a marvelous degree of accuracy and rapidity.

Receipts and Expenditures. Revenue for the Postoffice Department is derived from postage only, and the expenditures are for paying salaries, for transporting the mails, for the upkeep of postoffice and for incidental expenses. Only occasionally does the revenue approach the vast expenditure; in not more than half a dozen years since 1850 has there been a surplus from postal operations. The deficit is made up by Congressional appropriations, and ranges from \$30,000,000 to \$75,000,000; a low deficit is suggestive of national prosperity.

Classification of Postoffices. The post-offices in the United States are divided into

four classes, the division being based on their annual receipts. The first class includes all offices whose annual receipts from the sale of stamps exceed \$40,000, the second class, those whose receipts are from \$8,000 to \$40,000, the third class includes all offices whose yearly sales are from \$1,500 to \$8,000, and the fourth class includes all offices whose annual receipts are less than \$1,500. Postmasters of the first-class offices receive salaries of \$3,200 to \$8,000, those of the second class receive from \$2,400 to \$3,000, those of the third class, from \$1,100 to \$2,300. Postmasters of the fourth class do not receive stated salaries, but are paid by percentage on the stamps cancelled in their offices. Whenever the annual revenue of a fourth-class office amounts to \$1,100 it is placed in the third class. Postmasters of the first three classes of offices are appointed by the President, nominally for a term of four years. All fourth-class postmasters are under the civil service and are appointed by the Postmaster-General. Three-fourths of all the postoffices in the country are in the fourth class.

Classification of Mail. All domestic mail matter is divided into four classes. Each class has a specified rate of postage. These four classes and the postage rates which apply to each are as follows:

1 **First-Class** includes in general all written matter, namely letters, postal cards, and all matter wholly or partly in writing, whether sealed or unsealed. It also includes matter sealed or otherwise closed against inspection.

The Rates of Postage on domestic first-class matter are

(a) On letters and other matter, wholly or partly in writing (except the writing specially authorized in certain cases), and on matter sealed or otherwise closed against inspection,—3 cents an ounce or fraction thereof.

(b) On postal cards,—1 cent each.

(c) On private mailing cards conforming to legal requirements for such cards,—2 cents each.

(d) On "drop letters,"—2 cents an ounce or fraction thereof, when mailed at letter-carrier or rural delivery post offices, and addressed to persons served by carriers,—1 cent an ounce or fraction thereof when mailed at offices where letter-carrier service is not established or where patrons are not served by rural carriers. There is no drop rate on mail other than letters.

(e) First-class mail sent by air requires 6 cents postage for each ounce or fraction thereof (since 1935).

2. **Second-Class** includes newspapers and

periodicals bearing notice of entry as second-class matter. No limit of weight is prescribed.

The Rates of Postage on newspapers and periodical publications of the second class, when sent unsealed by others than the publisher or a news agent are—1 cent for each 2 ounces or fraction thereof (no limit), and the fourth-class rates (parcel post rates—see PARCEL POST) on parcels exceeding 8 ounces in weight, such postage being computed on each separately addressed copy or package of unaddressed copies.

The rates on second-class matter when mailed by the publishers thereof are fixed by law, different rates being applied to different zones.

Third-Class embraces practically all mailable matter not included in the first and second class, when sent in unsealed packages weighing up to and including 8 ounces. Among the principal items in the third-class are

(a) Circulars, printed letters sent in identical terms to several persons.

(b) Books, catalogues, and other printed matter (except periodicals, in second class), proof sheets and copy accompanying the same.

(c) Merchandise, farm and factory products, seeds, plants, etc.

The Rate of Postage on third-class matter is,—1½ cents for each 2 ounces or fraction thereof, up to and including 8 ounces, except that the rate on books (including catalogues) having 24 pages or more, seeds, cuttings, roots, scions and plants, not exceeding 8 ounces in weight, is 1 cent for each 2 ounces or fraction thereof, on each separately addressed piece or package.

The limit of weight of third-class matter is 8 ounces. Parcels of printed matter, merchandise, etc., exceeding 8 ounces in weight come within the fourth class and are mailable at the parcel-post rates.

Fourth-Class matter embraces that known as domestic parcel-post mail, exceeding 8 ounces in weight and includes merchandise, books, and all other mailable matter not embraced in the first and second classes. For rates in fourth-class matter, see PARCEL POST.

Special Delivery service, insuring prompt delivery within certain carrier limits at destination, is obtained by placing on any letter or other first-class mail weighing not over 2 pounds, 10 cents' worth of stamps in addition to the lawful postage, and on matter weighing more than 2 pounds and up to 10 pounds stamps to the value of 20 cents in addition to the regular postage, and on matter weighing more than 10 pounds, 25 cents in stamps additional.

The **Registry System** provides special safeguards for the safe transportation of valuable mail. The fees on domestic mail are from 15 cents to \$1.00, according to amount of indemnification provided, and 10 cents on foreign mail. Third and fourth class mail may also be insured against loss or damage, at fees from 5 cents to 25 cents, according to insurable values. These classes may also be sent

C. O. D. at fees from 12 cents to 25 cents, according to values, to Money Order offices only. For Money Order rates, see MONEY ORDER.

Foreign Mails. Letters from the United States to Canada, Mexico, Cuba, Great Britain, Spain, most of the countries of Central and South America may be sent at the rate of 2 cents an ounce or fraction thereof. To all other countries the rate is 5 cents an ounce or fraction thereof. The weight limit to all foreign countries except Canada is 4 pounds, 6 ounces, to Canada, 66 pounds.

Single postal cards to certain countries 1 cent each, double cards 2 cents, to certain other countries single cards 2 cents, double 4 cents.

The postage rate on printed matter of all kinds is 1 cent for each 2 ounces or fraction thereof, with weight limit of 4 pounds, 6 ounces. The rate on commercial paper is 5 cents for the first 10 ounces or less, and 1 cent for each additional 2 ounces. The rate on samples of merchandise is 2 cents for the first 4 ounces or less, and 1 cent for each additional 2 ounces. The registration fee to all foreign countries is 10 cents, in addition to postage.

Money Orders. See MONEY ORDER.

Postal Savings Banks. See SAVINGS BANKS, subhead *Postal Savings Banks*.

Canada. The Canadian postoffice system is organized on the same plan as that in the United States. There is a free delivery system in the larger cities, and rural delivery, begun in 1908, has developed rapidly. Money orders are issued payable in Canada, any part of the British possessions and the United States and its possessions. The fees range from five to twenty-five cents, according to the amount of the order.

Other Countries. The first letter post was established among the cities of the Hanseatic League (which see). There was a postal system in England in the time of Henry VIII, and the present English system is the outgrowth of that. The department is under the direction of the Postmaster-General, who is a member of the Privy Council and of the Cabinet. He is the only officer in the department who resigns on a change of the government, all the others being under civil service. The reorganization of the British postal system which placed it on its present basis was due to the efforts of Sir Rowland Hill, the originator of the postage stamp. The systems of all other European countries are modeled after the British system.

POTASH, a compound of carbon dioxide and potassium (potassium carbonate), used as fertilizer and in making glass and soap.

It occurs in plants and in some rocks. The largest natural deposit in the world is in the salt beds of Stassfurt, Germany. Similar deposits have been found in Spain, Sicily, and Eastern Russia. Before the World War the United States alone exported from Germany 250,000 tons of potash annually.

When the supply from this source was cut off by the war, efforts were started to procure potash from every available source, and by the close of the war the United States was producing 60,000 tons a year, one-third of which amount was obtained from the alkaline lakes of Nebraska. Some was produced by ashing the sea kelp of California and by leaching the green sands of New Jersey; it was also obtained from Alabama and Georgia shales; from the leucite deposits of Wyoming, from sugar beets and wood scourings. It has been found that potash can be extracted from the fumes of blast furnaces—Portland cement plants and pig iron furnaces—for potash occurs in iron ore, coke and lime; and it is estimated that enough potash can be recovered from this source to meet the entire need of the nation.

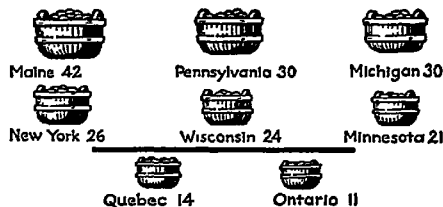
POTASSIUM, *po tas'si um*, a metallic chemical element, widely distributed in nature in combination with other substances, in plants, rocks and soils. It has nowhere been found in a free state in nature, and must be separated by electrolysis. Pure potassium is silvery white, is as soft as wax, and is the lightest of all metals except lithium. It has a strong affinity for oxygen, and in contact with water causes combustion, as it draws out the oxygen so rapidly as to generate enough heat to set the hydrogen afire. It is unaffected by perfectly pure, dry air, but in ordinary air becomes coated with a film of potassium hydrate and carbonate.

Among the numerous compounds of potassium are potassium carbonate, commercially known as potash (which see); potassium cyanide, a violent poison, used in photography and as a reducing agent; potassium bichromate, used in dyeing and in printing designs of fabrics; potassium nitrate, made by a double decomposition of sodium nitrate and potassium chloride, used in medicine and in the manufacture of gunpowder; and potassium chlorate, which also is used in the manufacture of explosives and in the arts as an oxidizing agent.

POTATO, one of the most popular and widely-used food plants in the world, be-

longs to the same family as the nightshade, the tomato and the tobacco plant.

The potato was discovered by the Spaniard's after the conquest of Peru, early in the sixteenth century, and by them it was taken to Europe, where it soon spread over the Netherlands, Burgundy and Italy. The plant is highly prized for the tubers, which are fleshy, underground stems, containing a large proportion of starch. As it was found in the wild state, the potato was small and of little



PRODUCTION ILLUSTRATED

The figures represent the average crop in millions of bushels in the United States and Canada, in the principal potato-producing areas

value, but the numerous varieties now in general cultivation have been obtained by improving the original species. The value of this plant for food can scarcely be overestimated. At the time of its discovery many countries of Europe were overcrowded and suffering frequent famines, from the failure of their grain crops. Since the potato would thrive in soils where grain could not profitably be raised, it added an important source of food to these countries

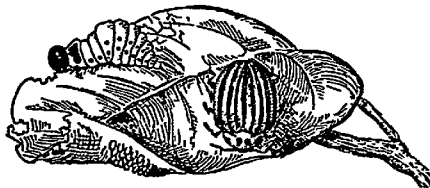
The top or stem is nearly square; it branches frequently, and grows to the length of from two to four feet, according to the richness of the soil. The blossoms are about three-fourths of an inch in diameter and are white, bluish or pink. The fruit proper is a spherical berry, about the size of a cherry. When ripe it is reddish-brown or purplish and contains a large number of small seeds, but the plant is propagated by planting the tubers, from the eyes of which new plants spring. Varieties are produced from the seeds, but the seed seldom reproduces a variety like that from which it sprang.

Besides its extensive use as an article of food, the potato is used as feed for stock and for the manufacture of starch. Tubers of the best quality are obtained in cool temperate climates, where soil and moisture are favorable to their growth. In the United States, Maine is the leading producer,

with an average yearly crop of nearly 43,000,000 bushels. Michigan and Pennsylvania are about equal in production and rank second, followed in order by New York, Wisconsin, Minnesota, and Idaho. The total crop for the country is about 400,000,000 bushels a year. Canada produces about 80,000,000 bushels a year, of which Ontario and Quebec each yield nearly one-third.

The Burbank Potato. At the age of nineteen in his home in Massachusetts, Luther Burbank heard the complaints of farmers who were unable to raise more than 200 bushels of potatoes to the acre. They clamored for a variety which would yield a larger acreage and enable them to make a little money from their labor. This young man began his experiments in crossing and development and the fourth year produced a potato so much improved in size and quality that an eastern seed house gave him \$125 for the sole right to use and produce the better variety. They named this the Burbank potato. At once this variety began to yield 435 bushels to the acre and since that time has produced 525 bushels. The United States Department of Agriculture, in a bulletin, gives credit to Mr. Burbank for adding \$17,000,000 a year to the agricultural output of the country, due solely to the development of the Burbank potato. See BURBANK, LUTHER.

POTATO BUG, or COLORADO BEETLE, a small beetle of yellow color, with ten black stripes on its wings. It is a native of the Rocky Mountains, where it lived, until the country was settled, upon the wild-potato plant. When the cultivation of potatoes was begun in the West, the beetles thrived and multiplied in astonishing numbers, and by 1875 they had spread all over the United States and Canada. The beetles lay their



POTATO BUG, YOUNG AND EGGS

orange-colored eggs on the under sides of the leaves of the new plants. In about a week these hatch into reddish slugs which feed hungrily upon the leaves and grow rapidly, fading in color and developing two

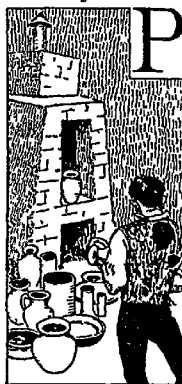
rows of black spots along the sides (see illustration). When they have reached maturity they drop off, burrow in the ground, and in about ten days emerge as full-grown beetles. There are sometimes as many as five broods a season. Spraying with preparations of Paris green will protect the plants; if the beetles are numerous the plants must be constantly tended.

POTOMAC RIVER, a river of the United States forming the boundary between Maryland and Virginia and Maryland and West Virginia. The Potomac is about 430 miles long and is formed by two branches which rise in the Alleghany Mountains and unite fifteen miles southwest of Cumberland, Md. The Monocacy, Shenandoah, Bull Run and Cacapon are its chief tributaries. The Potomac flows past Alexandria, Va., Washington, D. C., and Mount Vernon, the home of Washington. The picturesque gorge known as Harper's Ferry is memorable as the scene of John Brown's raid. In the upper part of its course the river is rapid and affords abundant water power. In its lower course the river broadens to meet Chesapeake Bay, into which it flows. The tide extends to Washington, 125 miles from the mouth.

POTS'DAM, PRUSSIA, capital of the province of Brandenburg and formerly the second royal residence of the monarch, is beautifully situated in the midst of wooded hills, seventeen miles southwest of Berlin, on the Havel. The principal buildings are the royal palace, Garrison Church, a French Protestant church, the town house, the Church of Saint Nicholas and the Barberini Palace. The palace of Sans Souci, in the vicinity of the city, was erected by Frederick the Great. In the neighborhood are the New Palace and Marble Palace. The city contains a number of public gardens and squares adorned with statues. The raising of winter violets is an important industry. The manufactures include optical instruments, sugar and beer. Population, 1933, 72,800.

POTAWATOMI, *pot ta wah'to my*, a term meaning *fire makers*, refers to an Algonquian tribe, first met by the whites near Green Bay, Wis. They subsequently moved south and settled on former Miami territory, where Chicago now stands. After the Illinois were driven out, the Potawatomi occupied the greater portion of what is now the state of Illinois and the southern part of Michigan

and Northern Indiana. About 900 Potawatomi living in Oklahoma are American citizens. There are other groups in Kansas, Indiana, Wisconsin and Michigan, and all told they number about 2,500.



POTTERY, vessels or utensils made from clay and hardened by firing. The art is known as ceramic from the Greek word *keramos*, meaning *pottery*.

History. Pottery making is one of the oldest of the arts, and has been practiced by primitive people as well as by civilized nations. Works found in Egypt and Babylonia as well as in the buried cities of Asia Minor and Greece attest to the skill these peoples attained in the manufacture of this ware. The Romans learned the secrets of pottery making from the Greeks and Etruscans, and with the extension of the Roman Empire their knowledge was disseminated to all parts of the civilized world. The Chinese and Japanese for centuries have excelled in the manufacture of delicate ware, and modern pottery is made on an extensive scale in leading countries of Europe and many cities of the United States. The Pueblo Indians of Southwestern United States and Northern Mexico were especially adept in pottery making. The manufacture of white ware was begun in America in 1685, and there has been a steady increase in the industry until at the present time the annual output is estimated as \$35,000,000; the largest potteries are located in Cincinnati, Jersey City, and on Long Island.

Varieties of Clay. Pottery is made of various grades of clay, to which sometimes small proportions of fine sand, powdered feldspar or flint are added, the kind and proportion of these ingredients determining the sort of ware.

Clays that contain any appreciable quantity of iron turn red when burned, as in the making of brick, and much of the coarsest grade of earthenware is made of this kind of clay. Other varieties turn to a cream color, and others become a reddish-brown. The finest quality of clay used for pottery is known as *kaolin* and is pure white. Some

varieties of clay contain enough sand to make the glaze or enamel, but for most wares this must be added. The glaze is made by different substances for different wares. That of stoneware, such as common jugs and crocks, is made by throwing common salt into the furnace, where it is decomposed and fuses with the clay. Other varieties of stoneware are glazed by a mixture of white lead, flint and glass ground together; while porcelain is glazed by still another composition.

Working the Clay. The first step in making pottery is to grind the clay to a very fine powder, which is mixed with water into a doughlike mass. In the manufacture of ordinary stoneware, a quantity of this dough sufficient for the vessel is attached to a horizontal wheel called the *potter's wheel*, which is worked by foot power. The workman forms the clay into a cone with a blunt apex. Then by inserting his thumbs into the apex of the cone and revolving the wheel, he roughly shapes the vessel with his hand. After this, the walls are pared and smoothed inside and out by tools of wood or leather. During the working, the clay, tools, and hands of the workmen are kept moist. When shaped, the vessel is placed in the drying room, where it is allowed to harden, after which it is ready for burning.

Firing. Vessels that are not round are usually cast in molds, made of plaster of Paris, each half of the vessel being made separately and the parts joined together when taken from the molds.

Pottery is burned, baked or fired in kilns, which vary in size and shape according to the sort of ware for which they are designed. The higher grades of ware are placed in cylindrical earthen boxes, called *saggers*. The saggers are stacked in the kiln by packing in tiers, one above the other. The ware is usually raised to a white heat, which is maintained for thirty-six hours or more, after which the kiln is allowed to cool slowly. When cold, the ware is taken from the saggers, and in this state it is called *biscuit*. The rough places on the surface are now smoothed, and other finishing touches are given, after which the ware is glazed.

Glazing. The process is accomplished by dipping the ware in a mixture called the *slip*. This is a solution of the glazing substance in water and is but little thicker than milk. The ware is dipped in, and on being removed, it is so handled that no drops are left standing

on the surface. The porous walls absorb the water and leave a thin coating on the surface, which, on a second firing, passes into the clay and forms the glaze. By the addition of necessary pigments, coloring can also be produced with the glaze. When this is poured on and allowed to run down until stopped by the heat, beautifully shaded effects are often produced.

Decorations are usually put on with a brush, either before or after glazing. If decorated after glazing, the ware must be fired a third time. Decorating requires great care and skill, as the colors, when put on, are entirely different from those which will appear after firing. For instance, gold is put on in the form of a chloride which has a brown color.

Varieties. Among the common varieties of pottery are the following:

Earthenware, which includes all of the coarser grades, from the ordinary stoneware, of which jugs and crocks are made, to the heavier grades used for culinary and table purposes. Earthenware is undoubtedly the earliest form of pottery, and rude articles are found among all uncivilized people.

Stoneware, a high grade of earthenware. The term is often applied to numerous varieties in most common use. It is hard, well enameled and often beautifully decorated.

Chinaware or Porcelain, the finest grade of pottery. It is made by mixing the best quality of kaolin with a Chinese clay containing a little silica. When fused at a high temperature these ingredients produce a beautiful translucent ware. Porcelain originated with the Chinese, hence the name china, or chinaware. It is known to have been manufactured as early as 950 B. C. From China and Japan come the most delicate and beautiful specimens of this ware. The manufacture of china was introduced into Europe early in the sixteenth century, and numerous establishments now exist both on the Continent and in England. The oldest and best known of these is near Dresden, Saxony, and from this city the ware has taken its name. Dresden china has attained wide popularity and is prized for its excellent quality and beautiful finish.

Related Articles. Consult the following titles for additional information:

China Painting	Kaolin
Clay	Majolica
Delft	Porcelain
Dresden China	Rockwood Pottery
Falencia	Wedgwood Ware

POTTSTOWN, PA., in Montgomery County, thirty-five miles northwest of Philadelphia, on the Schuylkill River and on the Pennsylvania and on the Philadelphia & Reading railroads. It contains rolling mills, blast furnaces, steel mills, bridge works, textile

mnills, silk, shirt and hosiery works and manufacturing of nails, agricultural implements, cigars and other articles. The borough has a state armory, two hospitals and the Hill School, a private instatution for boys. The place was established in 1752, and was called Pottsgrove until its incorporation in 1815. Population, 1920, 17,431; in 1930, 19,430, a gain of 11.4 per cent.

POTTSVILLE, PA, the county seat of Schuylkill County, thirty-five miles northwest of Reading, on the Schuylkill River and on the Philadelphia & Reading, the Pennsylvania, the Lehigh Valley, and the People's railroads. The borough is surrounded by anthracite coal fields, and is principally engaged in mining. It was here that anthracite coal was first used successfully for smelting iron ore. There are two railroad shops, a large steel plant, and manufactories of plush, velvet, explosives, machinery, textiles, bolts, nuts and shoes. The borough has a hospital, a very fine courthouse, a hospital and the Pottsville Athenaeum, which contains a library. The place was settled about 1800, was laid out as a town by John Pott in 1816, was incorporated as a borough in 1828 and was made a city in 1851. The commission form of government was adopted in 1914. Population, 1920, 21,786; in 1930, 24,300, a gain of 11.5 per cent.

POUGHKEEPSIE, *po kip'si*, N. Y., the county seat of Dutchess County, seventy-four miles north of New York City, on the east bank of the Hudson River and the New York Central and New York, New Haven & Hartford railroads. There are city and Federal airports. A ferry connects with the West Shore railroad. The city is built on an elevation about 200 feet above the river. It is the seat of Vassar College, a secretarial school, and a famous business college; it also has the Adrance Library, a state hospital for the insane and city hospitals. A cantilever bridge, 7,100 feet long, which here spans the Hudson, is of interest. The important industrial enterprises of the city include mowing-machine works, foundries, machine shops, a shoe factory, packing houses, lumber mills and manufactories of patent medicines, underwear, plows, cigars and cigarettes and other articles.

The place was settled by the Dutch in 1698, on the site of an Indian village called Apokeepsing, meaning *safe harbor*. During the Revolution, after 1778, it was the capital of

the state, and the convention which ratified the Federal Constitution met here. It was made a village in 1799, and was chartered as a city in 1854. Population, 1920, 35,000; in 1930, 40,288, a gain of 15 per cent.

POULTRY. In its broadest sense this term is applied to all domesticated birds—the hen, the duck, the goose, the turkey, the guinea fowl and a few other varieties—but the prominence which the chicken industry has gained in the last few years has caused poultry raising to mean chicken raising.

This industry attracts a large number of people because it leads to a pleasant out-of-doors life, and because, for the capital invested, it yields larger returns than any other branch of farm industry, provided those who enter upon it have a liking for the business and are willing to be patient and industrious workers. It is wise for one not acquainted with the business to begin with a small flock of chickens, and to add to these from time to time as his success will warrant. Some failures are bound to occur, and the wise poultryman, instead of becoming discouraged, will look for the causes of these failures and try to remove them.

Classification of Breeds. In the United States, poultrymen divide all breeds into three general classes; these are egg breeds, meat breeds and general-purpose breeds. Before selecting his stock the poultryman must decide whether he wishes to make eggs or meat his leading product or whether he wishes to supply both eggs and meat for the market. By this, we do not mean that should he decide upon eggs as his chief source of income he will have no meat to sell, or should he decide upon meat as his chief source of income he will have no eggs to sell. But if he selects egg breeds, he will have less meat, and if he selects meat breeds he will have fewer eggs for the market.

Egg Breeds. Most poultry farms center their interests on the production of eggs, since the largest revenue is derived from this source. Such farms are stocked with some one of the leading egg breeds. Among these, the Leghorns and the Minorcas are declared to be the best. Chickens belonging to the egg breeds are small and active, and they mature early.

Meat Breeds. These include chickens of a large size, such as the Cochins and Brahmas. They move slowly, mature late and are not good layers.

General-Purpose Breeds. These are medium in size, between the egg and the meat breeds, and they are found on most farms devoted to general farming. They are fair layers, and when mature furnish birds for the table weighing from six and one-half to eight and one-half pounds. The most popular general-purpose breeds are the Plymouth Rock, the Orpington and the Rhode Island Reds.

Care of Poultry. Eternal vigilance is the price of success on a poultry farm. A dry, sunny slope with good, natural drainage and plenty of shade is the most desirable plot for a chicken run. The plot of ground should be large enough to give the chickens ample room to run about, for they require a good amount of exercise. The chicken house should be convenient, and have ample provision for ventilation and cleanliness. It should protect the fowls from cold in winter and from heat in summer, and be so constructed as to prevent the entrance of rats, vermin and other chicken pests. Complete directions for constructing these houses are easily obtained from state agricultural experiment stations and from the United States Department of Agriculture, Washington, D. C.

Chickens should be fed with care, because the quality of both the eggs and the meat is affected by the feed. Layers should have a diet of grain, green food and animal food, and should be supplied with mineral matter that enters into the composition of eggshells. Grit and sand should also be readily accessible. Corn is considered the standard grain for fattening chickens, but wheat, oats and buckwheat are essential for layers. Chickens should be fed at regular intervals, and no more food should be given them than they will eat at the time.

Related Articles. Consult the following titles for additional information

Duck	Guinea Fowl
Egg	Incubator
Fowl	Pheasant
Goose	Turkey

POUND, a unit of weight employed in measuring many commodities. Three units are recognized—the *avoirdupois*, the *troy* and the *apothecaries'* pound.

Avoirdupois Pound. The avoirdupois pound is the unit of common weights in the English system of weights and measures. It contains 7,000 grains, and is divided into sixteen ounces.

Troy Pound. The troy pound is used in weighing gold, silver and precious stones. It

contains 5,760 grains, and is divided into twelve ounces.

Apothecaries' Pound. This has the same weight as the troy pound, but it is divided differently. It is used by pharmacists in compounding medicines.

The grain in all these pounds is the same.

Pound Sterling. This is the highest denomination in English money, and at par in gold is equivalent to \$4.8665 in United States and Canada money. The pound sterling received its name from the fact that a quantity of silver of that value weighed one pound. See **WEIGHTS AND MEASURES**.

POWDERLY, TERENCE VINCENT (1849-1924), an American labor leader, born at Carbondale, Pa. He worked as a switchman, car repairer and machinist and became influential in labor organizations. He was elected mayor of Scranton on the Labor ticket in 1878 and was reelected in 1880 and 1882. Six years later he was admitted to the Pennsylvania bar. He was commissioner-general of immigration from 1897 to 1902 and later was chief of the Division of Information in the Bureau of Immigration, Washington. He wrote *Thirty Years of Labor*, *The Labor Movement* and *The Problem of To-Day*.

POWELL, JOHN WESLEY (1834-1902), an American geologist, born in Mount Morris, N. Y., and educated in Illinois College, Jacksonville, and at Oberlin College, Ohio. In the Civil War he rose to be lieutenant colonel, and at the close of the war he became professor of geology in the Illinois Wesleyan University at Bloomington and later in the Illinois Normal University. In 1867 and years following, under direction of the Smithsonian Institution and the department of the interior, he conducted the geographical and geological survey of the Rocky Mountain region and was the first to explore the canyons of the Colorado. His *Contributions to North American Ethnology*, the results of his work, gained him recognition in the scientific world. In 1881 he was appointed director of the United States Geological Survey. His publications include many scientific papers and addresses and numerous government volumes. He served as president of the Anthropological Society of Washington and of the American Association for the Advancement of Science.

POWER, in mathematics, the product obtained by using a number as a factor two or

more times. The product of a number multiplied by itself is the second power, or square of that number; the product obtained by taking a number three times as a factor is the third power, or the cube of the number; four times, the fourth power, and so on. For example, $4 \times 4 = 16$; 16 is the square of 4; $4 \times 4 \times 4 = 64 = 4^3$; 64 is the cube of 4. The figure denoting the power to which a given number is to be raised is placed at the right and above the given number and is known as the *exponent*. The process of finding a power of a number is called *involution*.

Power, in mechanics, is the ability to perform work; it is energy directed toward an objective. The power of a machine to do work is stated in units compared with the established measure of the energy of a given standard. We hear a man say of his automobile that he has "eighty horses under the hood." He means to say that he has a motor of eighty horse-power. Horse-power is the standard measure of capacity to perform work. A good work-horse may be expected to raise 33,000 pounds one foot in one minute; this energy capacity has been adopted as the standard work unit in mechanics. If any mechanism develops power that will raise 33,000 pounds one foot in one minute, it is a machine of one horse-power; if it can lift 66,000 pounds the same distance in the same time, it develops two horse-power, and so on.

POWER OF ATTORNEY, an instrument authorizing the person to whom it is granted to act as the agent or attorney for the person granting it. A *general* power of attorney authorizes the agent to act in all cases for his principal. A *special* power of attorney restricts the agent to the particular acts named in the instrument. Courts hold the agent rigidly to the acts specified in the instrument. When the agent is required to execute an instrument under seal, his power of attorney must also be under seal. The death of the principal revokes the power of attorney. See **AGENT**.

POWERS, HIRAM (1805-1873), an American sculptor, the son of a farmer, born at Woodstock, Vt. As a boy he was employed in a clock factory in Ohio, whither his family had moved, and later he obtained employment in a museum in Cincinnati, remodeling and repairing wax figures. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him,

he determined to become a sculptor. In 1835 he went to Washington and had sufficient success there to enable him to proceed to Italy. He settled in Florence, where he resided until his death. His ideal pieces include *Eve Tempted*, *Eve Disconsolate*, *Proserpina*, *Fisher Boy* and *The Greek Slave*, the last a chaste and beautiful female nude. Powers' best work was done on portrait busts, and his heads of Franklin, Jefferson, Washington, Webster, Calhoun, Everett and Sheridan are in his best manner.

POWHATAN (1550-1618), *pou ha tan'*, an Indian chieftain, whose real name was WAHUNSONACOOK, Powhatan being the name of this tribe. Thirty-four tribes were under his rule, and his dominions extended from the head of Chesapeake Bay to the Roanoke River and inland about two hundred miles. He lived about fifteen miles from Jamestown, and had frequent dealings with the colonists. He took prisoner Captain John Smith, and, it is said, spared his life at the intercession of his daughter Pocahontas. After John Rolfe married Pocahontas and became his son-in-law, Powhatan was a friend of the English. See **POCAHONTAS**.

PRAETOR, *prætor*, an important magistrate in the ancient Roman state. The word means *leader*, and originally the name was merely an honorary title borne by the two consuls, but in 367 a new office was created, next in rank to the consular, and the incumbent, whose duties were judicial, was called praetor. Only patricians were eligible to the office until 337 B. C. In the middle of the third century two praetors were elected, the term of office being one year. The number was gradually increased, and in the time of the empire the number was sixteen. As the number of praetors increased the duties were divided. The later praetors served a year as judicial administrators and a year as provincial governors.

PRAETORIAN, præto'h'ri-an, GUARD, the bodyguard of the Roman emperors, made up of selected soldiers. Augustus organized the guard into nine cohorts, each consisting of 1,000 men, and made it a permanent institution. Under the later emperors the praetorians were increased in numbers and given double pay and greater importance. In time they gained the chief power in the state and were able to appoint, depose or murder emperors at will. It was only by bribery of the praetorian guard that a man

could secure the imperial dignity or could maintain it after he had secured it. Constantine abolished the institution in 312.

PRAGMATIC SANCTION, *sank'shun*, the name given, originally in the Byzantine Empire, to any important decree regarding affairs of state. The most important pragmatic sanction in the history of Europe was that issued by Charles VI, Holy Roman emperor, making his daughter, Maria Theresa, his successor to the throne. See **CHARLES VI**; **MARIA THERESA**.

PRAGUE, *prayg*, now called **PRAHA**, in the Bohemian section of Czechoslovakia, is the country's capital and largest city, on the Moldau River, 160 miles northwest of Vienna and 75 miles southeast of Dresden. The city is built upon both sides of the river, which is crossed by a number of fine bridges. The site is upon low hills, which rise gradually from the river. The city comprises seven districts, of which the Altstadt is the most interesting and most important commercially. Here, clustered about Grosser Ring, or the Great Square, are the Teynkirche, or the old Hussite Church; the Kinsky Palace; the townhall; the Kreuzherrenkirche, constructed after the plan of Saint Peter's at Rome; the Palace of Clan Gallas, the former palace of the Bohemian kings, and the Rudolphinum, a structure containing the conservatory of music, a museum of industrial arts and a picture gallery. Near by are the old university buildings, some of which date from the Middle Ages. In the Cathedral of Saint Viet, in the district of Hradsehin, is the marble tomb of the Bohemian kings.

The modern buildings include the Bohemian National Theater, the German Theater and the Bohemian National Museum. The city also contains a number of monuments and statues. The leading educational institution is the University of Prague, which dates from the Middle Ages (see **PRAGUE**, **UNIVERSITY OF**). The other educational institutions include the Royal German and Royal Bohemian Polytechnic institutes, a school of art and a conservatory of music. The city also is the home of several distinguished learned societies.

Prague was the third largest industrial city of the former Austro-Hungarian monarchy, following Vienna and Budapest. Most of the manufactories are located in the suburbs. The leading industries include the manufacture of engines, machinery, leather,

railway cars, chemicals, spirituous liquors, carriages, furniture, gloves, cotton goods and underwear. There are a number of breweries and flouring mills, and the printing and publishing business is of considerable importance. Population, 1921, of city and suburbs, 676,476; in 1931, 848,100.

For historic events connected with the World War see **Bohemia**, **Czecho-Slovak Republic**, **Austria-Hungary**, subhead **History**.

PRAGUE, **UNIVERSITY OF**, a name given to two universities situated in the city of Prague, one German and the other Bohemian, or Czech. The original University of Prague is the oldest German university. It was founded in the middle of the fourteenth century, but was based on a school that originated about one hundred years before. During the Middle Ages it suffered many changes and reverses, because of the religious conflicts by which it was disturbed. In 1419 the Catholics were expelled from the institution, and as a result the university lost much of its property and a large number of students. In the later part of the fifteenth century a number of colleges were founded, and the university again began to prosper. In the middle of the seventeenth century it became a Jesuit college.

The Czech movement of the nineteenth century resulted, at first, in an increase of attendance, but finally in the organization of the Czech University of Prague. In 1882 and 1883 the faculties of law, medicine and arts were established, to which some years later the faculty of theology was added. This gave the Bohemian university a prestige which enabled it to overshadow the German university, and it helped to keep alive that national consciousness which had its outcome in the establishment of the Czecho-Slovak Republic (which see). In 1935 the Czech University had an attendance of over 10,000, of whom over 1,800 were women, while that of the German University was only 5,000.

PRAIRIE, *prá'rie*, the name given to the vast natural meadows or plains of the Mississippi basin, especially the region lying between that river and the Rocky Mountains and extending northward into Central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication by water between all sections of the country. There is a sameness in the features of the sur-

face, the vegetable productions, the soil and the geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies*. Where vast herds of buffaloes used to roam over the prairies, immense tracts are now cultivated and produce large crops of wheat and maize. The prairies now constitute the most valuable agricultural region in the world.

PRAIRIE CHICKEN, a common name in the United States of the pinnated grouse. See GROUSE.

PRAIRIE DOG, a sort of ground-squirrel, once found numerously on the prairies west of the Mississippi and east of the Rocky Mountains. It is about one foot in length, exclusive of the rather short tail, is sturdy and



PRAIRIE DOG

stout in form, and has coarse gray hair. The animals live in colonies, in burrows, which are ingeniously built, having a mound of earth encircling the opening to prevent the entrance of surface rain water. These colonies at an early day sometimes covered several hundred square miles. Some people once believed a story now discredited that prairie dogs share their homes with certain owls and snakes.

PRAXITELES, *praxi'te les*, one of the greatest sculptors of ancient Greece, a citizen, if not a native, of Athens. He flourished about the middle of the fourth century B. C. Whereas Phidias had portrayed heroic subjects, Praxiteles sought to reproduce the beauty of the human in the nude. He executed several statues of *Apollo* and of *Aphrodite*. His *Aphrodite at the Bath*, in the Vatican, made for the city of Cnidus, was so highly valued by the Cnidians they refused to sell it to King Nicomedes, who, according to Pliny, was willing to take it as payment of the enormous debt imposed on the city. The group *Niobe and her Children* at Florence, Italy, and *Hermes Carrying Dionysus*, found at Olympia in 1877, are attributed to him. His gods and goddesses are not as majestic and awe-inspiring as are the deities of Phidias, but are superlatively

beautiful human beings, endowed with a delicate grace and charm. He worked in both marble and bronze, and his figures served as models to the artists who succeeded him.

PRECESSION OF THE EQUINOXES. When the ecliptic (the plane passing through the center of the sun and containing the earth's orbit) intersects the plane of the earth's equator the equinox occurs—once in spring, once in autumn. The time of occurrence varies slightly each year, owing to the attraction of the sun, moon and planets, so that each successive equinox arrives ahead of what would be its schedule if those celestial influences were removed, at the mean rate of 50' 37" annually. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic every 25,791 years. From the precession of the equinoxes and nutation in combination, the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic (see *NUSTATION*). At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving toward the sign Aquarius.

PRECIOUS STONES, or **GEMS**, stones of small size greatly esteemed for their beauty. They are sometimes found crystallized in regular shapes and with a natural polish, but they are more commonly of irregular shapes and have rough coats. The term *gem* often denotes more particularly a stone that is cut, polished or engraved, and it also includes pearls and various artificial productions. The most valuable gems are diamonds, emeralds, rubies, sapphires, opals and turquoises. Of less value are the garnet, the almandine, the tourmaline, the topaz, the amethyst, the chrysoprase, the chrysoberyl, the aquamarine, the heliotrope and the azurite. Agate, lapis lazuli and cornelian can scarcely be called gems.

In art and archaeology, the term *gem* is usually applied to a precious stone cut or engraved in ornamental designs or with inscriptions. Stones on which the design is raised above the general surface are called

cameos; those having the design sunk below the surface are called *intaglios*. Early specimens of cut gems are seen in the scarabaei, or beetle-shaped, signets worn in rings by the ancient Egyptians. Among the Greeks, Etruscans and Romans, gem sculpture held a high place, reaching its highest point under Augustus. Modern gem engraving dates from the beginning of the fifteenth century, the chief seats of the art being Italy and Germany. Rome is now the headquarters of the seal-engraving art.

From the earliest times precious stones have held definite meanings to people. Astrologers, or those who professed to read the stars, believed that precious stones also influenced the lives of people, and from the first century there was a special stone dedicated to each month of the year. Even wise men wore gems as charms, believing them to ward off disease and to bring good fortune. All ancient peoples of civilization used gems, and ascribed to each stone some special influence. In the Bible there are many references to precious stones; those worn on the breastplate of the High Priest were among the most significant features of his attire (*Exodus XXVIII, 15-30*). In the following passage the Jewish historian ascribes miraculous properties to these stones:

From the stones which the High Priest wore there emanated a light, as often as God was present at the sacrifice, that which was worn on the right shoulder instead of a clasp, emitting a radiance sufficient to give light to those far away, although the stone previously looked its splendor.

See *Gems, Artificial, Birthstones*, also articles on the gems named in the beginning of this article.

PREDESTINATION, a term used in Christian theology, derived from the Latin words meaning *determined beforehand*. In general, it means that God in the beginning so made the universe that everything that occurs in it is inevitable. As applied specifically to the life of man, the doctrine involves the belief that God "appointed certain men unto salvation," others to reprobation. The conception is a logical outgrowth of the belief that salvation in this world of sin would be impossible unless foreordained by God. It was developed by John Calvin, its chief supporter. It is opposed to the doctrine of free will, and has few adherents to-day.

PREEMPTION, a right given under early public land laws to citizens of the United

States, by which they could buy quarter-sections of the public land for a nominal price, by complying with certain conditions. A citizen who entered a preemption claim was given preference over all other persons. The preemption laws differed from the homestead laws in not requiring occupation or cultivation. They were repealed in 1891, because of abuses that had become general. See **HOMESTEAD LAWS, LANDS, PUBLIC**.

In international law, preemption is the right of one nation to seize property belonging to another nation, while it is being shipped across the former's territory. The right is used only in the case of property that is or may be contraband of war, and full value is given to the owner of the property. See **INTERNATIONAL LAW**.

PREMIER, *pre mee'*, meaning *first*, is the chief officer of state in a government Cabinet. He is known variously as Prime Minister, Chancellor, Grand Vizier, etc. In the constitutional nations of Europe, the Cabinet form of government, as fully developed by England, has been more or less faithfully copied, consequently there is in each of these countries an official corresponding to the English Premier. Canada and Australia have Premiers, but the United States has no such officer; its Secretary of State is not at all like the Premier of England. He does not select the other members of the Cabinet, is not superior to them, and is not responsible to Congress.

The Premier in Canada. As the members of the Cabinet only hold office as long as they are supported by a majority in the House of Commons, most of the Ministers are members of the lower house, though several are always Senators. The Ministry, therefore, is practically a committee made up of members of both Houses. Its head is known as the Premier or Prime Minister, though he is legally known as President of the Privy Council.

The title Premier originates from the fact that, as in England, he is the first called on to form a new Ministry. As the leader of a political party and as a man of commanding influence and ability, he is chosen to lead the Houses and control the government. It may be safely said, as a rule, that the government's policy is his policy, though each individual Minister has the right to communicate directly with the Governor-General, on all important public matters. Communication between the Cabinet and the Governor-

General takes place through the Premier. If the Premier dies or resigns, the Cabinet is dissolved, and the Ministers hold office only until a new Ministry is formed. In case the government, that is, the Ministry, is defeated on some important issue in Parliament, the Premier must either resign or convince the Governor-General that a new general election should be held, on the ground that the vote does not represent the popular sentiment.

Related Articles. Consult the following titles for additional information
Cabinet Ministry
Governor-General Privy Council

PREPOSITION, *prep o zish'un*, in grammar, a part of speech that introduces a phrase modifier and shows the relation between the principal word of the phrase and the word the phrase modifies. Examples of prepositions are *in*, *of*, *on* and *over*. In the sentence, "The house stands *on the hill*," the preposition *on* shows a relation between the word *hill* and the verb *stands*, which the phrase modifies.

PRE-RAPHAELITES, *pre raf'a el ites*, a group of English painters and writers organized in 1848, so called because they derived their inspiration from painters before the time of Raphael. Leaders in the movement were Dante Gabriel Rossetti, his brother William Michael, John Everett Millais and William Holman Hunt. The art of these men represents a reaction against the artificial tendencies of their day, and a return to the simplicity and spirituality of such early painters as Giotto, Fra Angelico and others of the early Renaissance. The movement exerted a wholesome and far-reaching influence on English art.

PRESBYTERIANS, members of a branch of Protestantism in which the local churches are governed by *presbyters*, or elders. The officers of a Presbyterian church are the pastor, elders and deacons. The pastor, together with the elders, looks after the spiritual affairs of the church, and the trustees look after the financial affairs. The pastor and elders constitute a *session*, which has power to admit and to discipline members. The session is under the control of a *presbytery*, which is composed of the ministers and one or more elders from each church in a given district. Presbyteries combine to form a *synod*, and, controlling all, is the *general assembly*, which meets annually and to which synods can appeal certain cases.

In the United States appeals are restricted to cases involving doctrine and government.

The Presbyterian creed is found in the Westminster Confession of Faith and in the Longer and Shorter Catechisms. In 1902 the general assembly adopted some important revisions of the creed. The doctrine of predestination was modified so as to embody the idea that God loves all mankind and that no man is condemned, except for his own sin; the article concerning infants who die before baptism was modified to embody the idea that all who die in infancy are saved by Christ, through his spirit.

History. John Calvin (see CALVIN AND CALVINISM) is considered by some to be the originator of this form of church government, though elders constituted the ruling body among the Waldenses (see WALDENSES). Presbyteries were formed in England during Elizabeth's reign, though much against her will. The Presbyterian creed, confession of faith and form of church government and directory for worship were formulated by an assembly in 1647 and approved by Parliament in the same year, but they were never established in the Church of England. Presbyterianism was established in Scotland in 1560 under the leadership of John Knox (see KNOX, JOHN), and in 1592 it was ratified by Parliament. Presbyterians were among the early New England colonists, and many of them settled about Boston and formed the majority of the colony of Massachusetts Bay. The first American presbytery was organized in 1707, the synod of Philadelphia was formed in 1716 and a general assembly was organized in 1788. The original church in the United States divided on the question of slavery just before the outbreak of the Civil War, and the United Synod of the Presbyterian Church South was organized. The Presbyterian Church of the Confederate States was also organized in 1861, and since the Civil War it has been known as the Presbyterian Church of the United States. It has a strong following in the South. The United Presbyterian Church of North America is distinguished by using only the Psalms in song. In 1873 the World's Alliance was formed among all branches to unify missionary work. In Canada in 1925 the Presbyterians joined the Methodists and Congregationalists in forming the United Church of Canada, a union that time has fully justified.

PRESCOTT, ARIZ, the county seat of Yavapai County, 137 miles north of Phoenix, on the Atchison, Topeka & Santa Fe Railroad. The city is on an elevation of 5,340 feet, the plateau being larger than the state of Connecticut, in a rich mining country, producing gold, silver, tungsten and copper. Stock raising and lumbering are important industries. The city has a Carnegie Library, a courthouse, a Federal building, a Masonic Temple, Sharlott Hall Museum, Smoki Museum, Saint Joseph's Academy and the Home for Aged Arizona Pioneers, and U. S. Veterans' Hospital. There is an airport. Population, 1930, 5,517.

PRESCOTT, WILLIAM HICKLEY (1796-1859), an American historian of Spanish conquests in America, born at Salem, Mass. When he was graduated from Harvard College, at the age of twenty-one, he was nearly blind, having entirely lost the sight of one eye through accident and the partial loss of the other through overwork. With the aid of readers and secretaries he spent several years in literary research, in the course of which he published a number of essays. In 1837 he published his first history, *The Reign of Ferdinand and Isabella*. It was received with enthusiasm, both in



WILLIAM H. PRESCOTT
America and Europe. It was rapidly translated into French, Spanish and German, and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico*, with a *Preliminary View of the Ancient Mexican Civilization and the Life of the Conqueror, Hernando Cortes*, which appeared in 1843 and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru*, with a *Preliminary View of the Civilization of the Incas*. Eight years later the first two volumes of the long-expected *History of the Reign of Philip the Second, King of Spain*, appeared, and in 1858 a third volume was published; but before the work was completed, Prescott died from apoplexy, at his home in Boston, Mass.

Prescott ranks with Motley and Parkman as an American historian of first rank. Since his histories were written, American archaeological research has shown that the early chroniclers on whom Prescott depended for facts were unreliable; but in general the historian's accounts are accurate, and his style is highly entertaining.

PRESIDENT OF THE UNITED STATES. The Constitution declares that the law-executing department of the government shall be in the hands of a President of the United States, who shall be chosen by electors, and not elected directly by the people; his term of office was fixed at four years; he may legally succeed himself.

The system of electing the President and Vice-President is not clearly understood by many people. As a rule, we fail to see why it would not be right that every legal voter in the country should cast his vote directly for President and Vice-President. The plan adopted in the convention which framed the Constitution was the result of a compromise. One section demanded that the President be elected by Congress, and that in the selection the people directly should have no choice. Another faction desired to place the responsibility fully upon the people by direct vote. By the plan adopted, each state was empowered to choose by vote, a number of men equal to its total membership in Congress, and the men so chosen were to meet on the same day all over the United States in the various state capitals and there cast their votes directly for President and Vice-President. If a state has ten Representatives and two Senators, it is entitled to choose twelve electors of the President and Vice-President.

Nominations. The young men and young women of to-day have not failed to note that every four years representatives of the great political parties assemble in national convention and nominate men for the offices of President and Vice-President. About the same time in every state in the Union the people, either by direct vote or in state party conventions, name for each party as many electors of the President and Vice-President as the state has representation in Congress. When "Presidential election" day comes, on the first Tuesday after the first Monday in November, each qualified voter in the United States is entitled to vote with the party of his choice indirectly for President and Vice-President of the United States. However, if,

he understands the Constitutional provision, he knows he does not vote directly for these high officers; he votes for the men (the electors) who in due time will elect the President and Vice-President. The next morning after election day the people all over the United States know the names of the next President and Vice-President, although as a matter of fact, these officers have not yet been chosen. If in any state the republican party casts the most votes, the republican electors are chosen; in democratic states the democratic electors are chosen.

Electoral College. On the first Monday after the second Wednesday in December following the date of the election, the electors who have been chosen in every state meet in the capitals of their states and proceed to vote by ballot for President and Vice-President of the United States. Legislation in 1934 made the above date conform to Amendment Twenty. See **ELECTORAL COLLEGE** article.

Election by the House. It is possible in any election of President and Vice-President that there is no choice in the electoral college. The Constitution prescribed that "the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors." Now, to secure a majority of the electors one candidate must receive more votes than all the other candidates combined. If he is not thus fortunate, the vote of the electoral college is not decisive, and the election of President and Vice-President is then thrown on Congress. The Constitution prescribes that the House of Representatives shall then choose the President, and this is doubtless due to the fact that the House is nearer to the people than is the Senate. If the election of President thus falls upon the House of Representatives, it is provided that the vote in the House shall be taken by states, the entire representation from each state having only one vote. Therefore, the decision of the majority of Representatives from a state would control the single vote of that state for President. The election of Vice-President, in case there is no choice in the electoral college, falls to the duty of the Senate.

Twice in the history of the country the election of President and Vice-President has devolved upon Congress. In 1800 Jefferson and Burr received the same number of electoral votes and in the House of Representa-

tives Jefferson was elected. In 1824 in the electoral college Jackson received 99 votes, Adams, 84, Crawford, 41, and Clay, 37. Jackson had a plurality of votes but lacked 32 of a majority. The House of Representatives elected Adams.

Inauguration. The Twentieth Amendment to the Constitution, adopted in 1933, provides that the President shall assume his office on January 20, beginning in 1937.

Succession to the Presidency. The Vice-President of the United States must have the same qualifications as the President, for upon the death, removal, or entire disability of the latter, the Vice-President assumes the position of President and retains it during the remainder of the term for which the President was originally elected. Previous to 1886 there was no provision for succession beyond the Vice-President; an embarrassing situation might have arisen had both the President and Vice-President died in office, or become disqualified. In the year named the Presidential Succession Law was passed, providing that after the Vice-President the Secretary of State should succeed to the Presidency, if he possessed the legal qualifications, and after him in turn, the Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy and Secretary of the Interior. The Secretary of Agriculture, the Secretary of Commerce and the Secretary of Labor, later made members of the Cabinet, are not included in the succession.

Qualifications of the President. The Constitution declares that the President of the United States must be thirty-five years of age and a natural-born citizen, and that he must have resided within the country for fourteen years previous to his election. One of foreign birth can never attain to the Presidency; a citizen of the United States whose business has called him out of the country for a period of fourteen years prior to the date of nomination is ineligible unless his absence has been in the service of the government.

Salary. The President of the United States at first received a salary of \$25,000 per year. In 1873 it was doubled, but the law increasing it was coupled with an obnoxious proposition to increase the salaries of members of Congress from \$5,000 to \$7,500, which increase should date back to the beginning of the Congress about to expire. This act was called the Salary Grab; it was

Presidents of the United States

	BORN	NATIVE STATE	COLLEGE	OCCUPATION OR PROFESSION	POLITICAL PARTY	AGE AT INAGU- RATION	SERVED	AGE AT DEATH	PLACE OF BURIAL
1. George Washington	1732	Virginia		Planter	Federalist	57	1789-1797	67	Mount Vernon, Va
2. John Adams	1735	Massachusetts	Harvard	Lawyer	Federalist	61	1797-1801	90	Quincy, Mass
3. Thomas Jefferson	1743	Virginia	William and Mary	Planter	Republican*	57	1801-1809	83	Monticello, Va
4. James Madison	1751	Virginia	Princeton	Lawyer	Republican*	57	1809-1817	85	Montpelier, Va.
5. James Monroe	1758	Virginia	William and Mary	Lawyer	Republican*	58	1817-1825	73	Richmond, Va
6. John Quincy Adams	1767	Massachusetts	Harvard	Lawyer	Republican*	57	1825-1829	80	Quincy, Mass
7. Andrew Jackson	1767	North Carolina		Lawyer	Democrat	61	1829-1837	78	Hermitage, Tenn
8. Martin Van Buren	1782	New York		Lawyer	Democrat	54	1837-1841	79	Kinderhook, N. Y.
9. William H. Harrison	1773	Virginia	Hamden-Sidney	Farmer	Whig	68	1841 (1 mo.)	68	North Bend, Ohio
10. John Tyler	1790	Virginia	William and Mary	Lawyer	Democrat	51	1841-1845	71	Richmond, Va
11. James K. Polk	1795	North Carolina	University of N C	Lawyer	Democrat	49	1845-1849	53	Nashville, Tenn
12. Zachary Taylor	1784	Virginia		Soldier	Whig	64	1849-1850	65	Springfield, Ky.
13. Millard Fillmore	1800	New York		Lawyer	Whig	50	1850-1853	74	Buffalo, N. Y.
14. Franklin Pierce	1804	New Hampshire	Bowdoin	Lawyer	Democrat	48	1853-1857	64	Concord, N. H.
15. James Buchanan	1791	Pennsylvania	Dickinson	Lawyer	Democrat	65	1857-1861	77	Lancaster, Pa.
16. Abraham Lincoln	1809	Kentucky		Lawyer	Republican	52	1861-1865	56	Springfield, Ill
17. Andrew Johnson	1808	North Carolina		Tailor	Republican	56	1865-1869	66	Greenville, Tenn.
18. Ulysses S. Grant	1822	Ohio	West Point	Soldier	Republican	46	1869-1877	63	New York City
19. Rutherford B. Hayes	1822	Ohio	Kenyon	Lawyer	Republican	54	1877-1881	70	Fremont, Ohio
20. James A. Garfield	1831	Ohio	Williams	Lawyer	Republican	49	1881 (6 1/2 mo.)	49	Cleveland, Ohio
21. Chester A. Arthur	1830	Vermont	Union	Lawyer	Republican	50	1881-1885	56	Albany, N. Y.
22. Grover Cleveland	1837	New Jersey		Lawyer	Democrat	47	1885-1889	71	Princeton, N. J.
23. Benjamin Harrison	1833	Ohio	Miami	Lawyer	Republican	55	1889-1893	67	Indianapolis, Ind
24. Grover Cleveland	1837	New Jersey		Lawyer	Democrat	55	1893-1897	71	Princeton, N. J.
25. William McKinley	1843	Ohio	Allegheny College	Lawyer	Republican	54	1897-1901	58	Canton, Ohio
26. Theodore Roosevelt	1858	New York	Harvard	Publicist	Republican	42	1901-1909	60	Oyster Bay, N. Y.
27. William H. Taft	1857	Ohio	Yale	Lawyer	Republican	51	1909-1913	73	Arlington, Va
28. Woodrow Wilson	1856	Virginia	Princeton	Educator	Democrat	56	1913-1921	67	Washington, D. C.
29. Warren G. Harding	1855	Ohio	Ohio Central	Editor	Republican	55	1921-1923	57	Marion, Ohio
30. Calvin Coolidge	1872	Vermont	Amherst	Lawyer	Republican	51	1923-1929	60	Plymouth, Vt
31. Herbert Hoover	1874	Iowa	Stanford Univ	Engineer	Republican	55	1929-1933		
32. Franklin D. Roosevelt	1882	New York	Harvard	Lawyer	Democrat	51			

*The Republican party of Jefferson, Madison and Monroe is now known as the Democratic party

Adams was nominally a Republican, but was in reality a Federalist

Outline on the President

I. THE PLACE OF THE PRESIDENT IN THE GOVERNMENT

II. TERM OF OFFICE

- (a) Number of years
- (b) How often can he be re-elected?

III. ELECTION

- (a) Nominating conventions
- (b) Direct primaries
- (c) Manner of election
 - (1) By electors
 - (2) By House of Representatives

IV. QUALIFICATIONS

- (a) As to birth
- (b) Age
- (c) Residence

V. VACANCY IN THE OFFICE

- (a) For what reason may the Presidency be vacated
- (b) How is a vacancy filled

VI. SALARY

- (a) Amount
- (b) Record of changes in

VII. OATH OF OFFICE

VIII. POWERS AND DUTIES

- (a) Commander in chief of army and navy
- (b) Commander in chief of militia when in actual service
- (c) By and with consent of Senate appoints many government officials
- (d) Fill vacancies occurring during Senate recess
- (e) Grant reprieves and pardons, except in cases of impeachment
- (f) With the concurrence of the Senate make treaties
- (g) Convene either or both Houses of Congress, if occasion demands
- (h) Recommend such measures to Congress as he shall judge expedient
- (i) Receive ambassadors and public ministers
- (j) Faithfully executes the laws

repealed and the President's salary again reduced to \$25,000. Soon afterwards it was increased to \$50,000, at which figure it remained until 1909, when it was fixed at \$75,000. An allowance of \$25,000 a year for traveling expenses is made, and other sums for certain White House functions.

The President's Cabinet. See **CABINET**.

PRESS, LIBERTY OF THE. See **LIBERTY OF THE PRESS**.

PRESSBURG, *pres'boorK*, CZECHOSLOVAKIA, capital of the County of Pressburg, is situated on the north bank of the Danube amid the Carpathian Mountains, thirty-five miles east of Vienna. Pressburg was for centuries one of the finest cities of Hungary. Spacious boulevards now occupy the space where formerly stood the old fortifications, and within the city are beautiful streets and squares, adorned with statuary and flowers. Among the historic structures of special interest are the old Gothic cathedral, dating from the eleventh century and restored in 1861-80, in which many of the kings of Hungary were crowned; the old castle, once the residence of the kings of Hungary, but now a ruin, and the townhall, dating from the thirteenth century and containing a valuable museum of Roman antiquities. Other interesting features are the Winter Palace, formerly the residence of the Primate of Hungary; the Landhaus, which was the seat of the Hungarian Diet until 1848, and the equestrian statue of Marie Theresa. The leading manufactures include dynamite, pastry, cabinet work, tobacco, ribbons, cloth, machinery, leather and chemicals. The city has a prosperous trade, principally in cattle, grain and wine. In 1541, when the Turks captured Buda, Pressburg became the capital of Hungary, and it held this position until 1784. Pressburg, also called Bratislava, became part of Czechoslovakia when Hungary was dismembered after the war. Population, 1930, 123,852.

PRESTON, Ont., in Waterloo County, on the Canadian National and Canadian Pacific railways; electric railways connect it with Kitchener, Galt, Paris and Brantford. The chief manufactures are agricultural implements, woodworking machinery, electric cars, metal shingles, piano players, stoves, woolen goods, furniture and shoes. The district produces live stock, grain and vegetables. Mineral springs make the town a popular resort. Population, 1931, 6,280.

PRETORIA, TRANSVAAL, the administrative capital of the Union of South Africa, and capital of the province of the Transvaal, is situated on the Aapies River, forty-six miles by rail northeast of Johannesburg. It has broad streets lined with shade trees, and many substantial buildings. The most important structures are the former Parliament House, the government offices, the postoffice and the University College Library. The city was founded in 1855 and named for the Boer leader, Andries Pretorius. When the Union of South Africa was formed, Cape Town and Pretoria were rivals for the honor of becoming the capital. The contest was settled by making Pretoria the seat of administration, and Cape Town the seat of legislation. Population, European, 1931, 62,138.

PREVAILING WESTERLIES, the prevailing winds of the temperate zones. In the northern hemisphere these winds blow towards the southeast; in the southern hemisphere they have a northeasterly direction. South of the equator between the fortieth and sixtieth parallels, these winds attain such a tremendous velocity that sailors call them the "roaring forties." North of the equator, however, interrupted by the great land masses, especially by the mountains, and by cyclonic disturbances, they do not blow in a steady gale, and often they lose their identity altogether. However, when general weather conditions are normal one can almost always detect an eastward movement of the highest clouds, due to these winds. See **WIND**, **TRADE WINDS**.

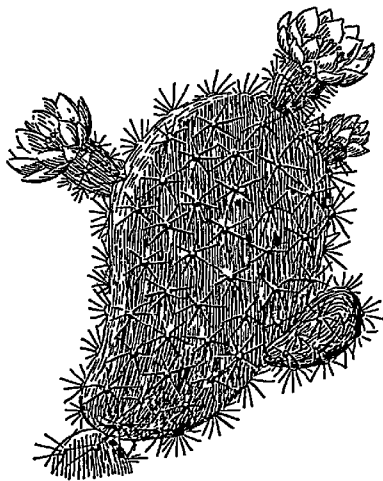
PRIAM, in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, among them Hector, Paris, Cassandra and Troilus. His name has been rendered famous by the tragic fate of his entire family, as a result of the Trojan War. Homer gives no account of the death of Priam, but other poets relate that he was slain by the son of Achilles when Troy fell into the hands of the Greeks. See **TROY**.

PRIBILOF, *pre'be lof*, **ISLANDS**, a group of small islands in Bering Sea, about equidistant from the crescent of the Aleutian Islands and the mainland of Alaska, named for their discoverer in 1786. When the United States bought Alaska, the Pribilofs were included in the transaction. The two largest islands are St. Paul and St. George,

with a combined population of 400. The government maintains a wireless station on St. Paul.

The Pribilofs are the home and breeding-place of the valuable fur seal, but they center on the islands containing no inhabitants. These animals probably chose these volcanic spots in the sea because of their isolation and the added security of a home fog enshrouded for much of the year. At one time the herd decreased to about 130,000 individuals and was threatened with extinction, due to unlimited slaughter, but treaties stopped depredations, and the number that breed there now is close to a million. See **SEAL**.

PRICKLY PEAR, or **INDIAN FIG**, a name given to an American genus of cacti containing about 150 different species, most of which grow in the southwestern part of the United States. The common prickly pear is a perennial and bears yearly, between June and October, beautiful, showy, solitary flowers, sometimes red or white, but usually yellow and about three inches in diameter.



PRICKLY PEAR
The cochineal cactus

The stem is composed of flat, oval joints, which grow in zigzag formation and are leafless, but covered with sharp spines. Some species, as the Indian fig, found in dry, sub-tropical regions, where few other plants will grow, bear nutritious fruit.

This plant is an interesting example of adaptability to environment and of the law of survival of the fittest. In the desert re-

gion where vegetable food is scarce, wild animals would long ago have exterminated the plant if it had not so well protected itself against them with its armature of spines. Except for its spines the plant makes excellent fodder for cattle, and if cultivated it may be coaxed to cast off its weapons; indeed, Burbank has succeeded in producing a spineless variety which is of economic value. See **CACTUS**; **COCHINEAL**.

PRIDE'S PURGE. See **RUMP PARLIAMENT**.

PRIEST, in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites and to act as a mediator between worshippers and whatever being they worship. In some countries the priesthood has formed a special order, or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac and Jacob performed priestly acts and drew "near to the Lord," as did also Job, and the Arab sheikh to-day unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high priest and the Levites.

The priests of the Church of Rome are bound to a life of celibacy, but in the Greek Church they are allowed to marry. In the Roman Catholic hierarchy the priesthood, which includes many orders, has the lowest rank; in the Anglican and other Episcopal churches, the priests form the second order of clergy, bishops ranking first.

PRIMARY ELECTION, a method of election by which the voters are enabled to express their preference for the candidates for office in their respective political parties. In other words, the primary election is a *nominating* election. In order that a candidate may have his name placed on the ballot he must file a petition signed by a certain per cent of the voters of his party in the political unit over which the office has jurisdiction. If he is running for alderman, this unit is the ward which he is to represent in the city council; if he is candidate for county supervisor, the unit is the county.

According to the plan largely followed, at a primary election the voter is required to declare his political party. In that case the ballots are strictly party ballots, and the

voter can vote for candidates only in his party. However, at the regular election he is free to vote for any candidate on the ticket, regardless of the party to which he belongs.

The primary election originated in the United States. At first it was restricted to local elections, but its scope has been extended until now state officers, Representatives in Congress, United States Senators and, in many states, Presidential electors are nominated at the primaries.

PRIMATES, *pri ma'tees*, the highest order of life in the animal kingdom. It includes man, apes, monkeys and lemurs, and is a division of the class mammalia.

Related Articles. Consult the following titles for additional information:

Ape	Gibbon	Man
Aye-aye	Gorilla	Monkey
Baboon	Lemur	Orang-utan
Chimpanzee	Mammals	Zoology

PRIMOGENITURE, *pri mo jen'e ture*, the right of the eldest son and those who derive through him to succeed to the property of an ancestor. The institution existed among the ancient Hebrews, but was particularly developed under the feudal system. It was introduced into England by the Normans, and that country remains to-day the only conspicuous example of its survival in Europe. The law of primogeniture was long ago abolished in the United States. According to it the eldest son is entitled by law to the whole of his deceased father's real estate. If the eldest son dies, his son succeeds to the land. If the whole male line is exhausted, the law becomes inoperative and all female heirs share equally—except in the case of the Crown, which always goes to the eldest. It is owing to the operation of this law that extensive English estates have remained undivided in certain families generation after generation.

PRIMROSE, a genus of plants comprising about 200 species, chiefly perennials, native to North America, Europe and Asia. The common European primrose, abundant in woods, meadows and hedges, has a short, upright stalk bearing both the leaves and the flowers, the former, small and cup-shaped, the latter pale yellow, each on a short separate stem. It is related to the cowslip, and from it many of the cultivated varieties have been developed. In the United States the primrose extensively cultivated is a Chinese variety. It is of different structure from the European primrose, having a thick cluster of large furry leaves growing close to the soil.

From the midst of these rise slender stems, bearing fragrant blossoms varying in color from delicate shades of pink to violet and



COMMON PRIMROSE

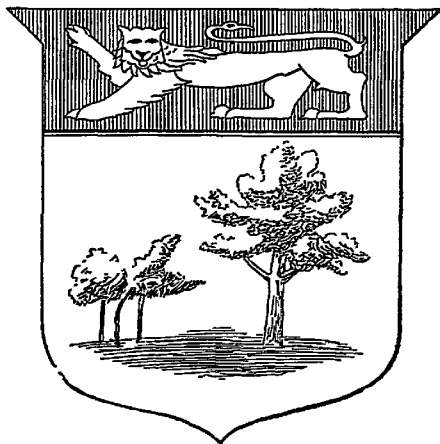
purple. These blossoms are sometimes single, and sometimes are in clusters. Several Japanese and other varieties are cultivated in gardens as ornamental plants.

PRINCE, literally, one who holds first place. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and nearest relations. In Germany under the empire there was a class of sovereigns who bore the title of prince, *First*, as a specific designation; members of royal families were called *Prinzen*. On the Continent there are many ancient families not immediately connected with any reigning house, who bear the title of prince, while in England dukes and earls are sometimes called princes. The British heir apparent bears the title Prince of Wales.

PRINCE ALBERT, SASK, a city on the Canadian National, and Canadian Pacific railways, and on the North Saskatchewan River, eighty miles north of Saskatoon. There is a Roman Catholic cathedral, an Anglican pro-cathedral, a separate school, a collegiate institute, a hospital, an armory and a permanent land show building. The city is in a beautiful country, especially suited to spring wheat and oats, but also known for fishing and shooting. Three large lumber companies here cut about 100,000,000 board feet a year. Other large industrial plants include brick plants, three flour mills, a cold storage plant, planing mills, marble and granite works, and saddlery factory. Prince Albert is the headquarters of a judicial district and of the Royal Canadian Mounted Police for Central and Northern Saskatchewan, and is the seat of the provincial jail and penitentiary. Population, 1931, 9,905.

PRINCE EDWARD ISLAND, an island forming the smallest province of the Dominion of Canada, is located in the Gulf of Saint Lawrence and separated by Northumberland Strait from New Brunswick, on the east, and Nova Scotia, on the south. Its greatest length, from east to west, is about 145 miles; its breadth varies from four to thirty-four miles, and its area is 2,184 square miles. The coast line presents a remarkable succession of large bays and projecting head lands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is well suited for agriculture and pasturing, the forests now being of comparatively limited extent. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild, and there is abundant moisture for vegetation.

Practically all of the soil except that of a few marshes along the coast is suitable for



COAT OF ARMS OF PRINCE EDWARD ISLAND

The lion, as in several other provinces, is used as the emblem of British sovereignty. The large oak and the three saplings stand on an island, representing the province. The three saplings represent the three counties into which the province is divided. When properly coloured the lion is gold, on a red background the tree and the island are green, on a white or silver background.

cultivation, but in some localities it became nearly exhausted before the farmers began to use fertilizer. The fertilizer now in general use is "mussel mud," which is dredged from

the river beds and bays of the island. Agriculture is the chief occupation, and the leading crops are oats, potatoes and turnips. Some wheat is raised and dairy husbandry is increasing in importance. Cattle, hogs and sheep are raised in considerable numbers, but horses constitute about two-thirds of the live stock.

Prince Edward Island has the distinction of originating fur farming, which has been extended to every province of Canada, now the leading fur-farming country of the world (see FUR AND FUR TRADE). The first experimental farm was started in 1887. The industry centers around the silver black fox. The temperature and humidity of the island produce fine, thick fur, and fox farming has become one of the valuable industries. There are over 860 ranches on the island ranging from two pairs to over 100 pairs for each. The annual revenue to the breeders of silver black foxes is over \$3,000,000. These foxes for breeding purposes are in great demand.

The fisheries give employment to about 3,600 men, and the annual catch is valued at \$1,000,000 to \$1,500,000. About sixty per cent of the catch are lobsters; cod, herring, oysters, smelts and mackerel are the other fish of importance.

The manufactures are chiefly confined to linen and flannels for domestic use. The exports consist of timber, agricultural produce and live stock, and the imports include dry goods, hardware, cordage and iron.

A railway runs from one end of the island to the other. The capital is Charlottetown (which see). The public affairs of the island are administered by a lieutenant-governor, nominated by the Crown, who appoints an executive council of nine members. There is also a legislative assembly of a single house, elected by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot in 1497. It was first colonized by France, was captured by the British in 1745, was restored and recaptured and finally in 1873 it was admitted to the Dominion of Canada. The inhabitants are almost all of British descent. Population, 1931, 88,038.

PRINCE OF WALES. See WALES, PRINCE OF.

PRINCE RUPERT, B. C., on Kaien Island, 550 miles north of Vancouver. It is the western terminus of the Canadian Na-

tional Railway and has direct steamship communication with foreign ports. It is a port of call for coastwise boats. It is 400 miles nearer Japan than is any other Pacific port, is located on an excellent harbor, east of the Queen Charlotte Islands, and south of the most southern point of Alaska. The surrounding country has unlimited agricultural, mineral and forest resources, and the bay and nearby rivers abound in fish, extensive fishing industries have been established here.

Before lots were offered for sale the city was laid out and grades established by engineers acting conjointly with the government and the railway company; the first lot was sold in May, 1909. Immense cold storage and fish-curing plants, creameries and a large sash and door factory are worthy of mention. Population, 1931, 6,350.

PRINCETON, BATTLE OF, an important battle of the Revolutionary War, fought January 3, 1777, at Princeton, N. J. On January 2, Cornwallis occupied a position on the west bank of the Assumpink River, opposite an inferior American force under Washington. Washington evaded battle by moving his whole army about Cornwallis's position to the northward, leaving a few men to keep his camp fires burning and make noises to deceive the British commanders. He soon met a force of about 2,000, coming from Princeton to join Cornwallis. After a hard battle the British were routed and Washington took up a strong position at Morristown, while Cornwallis retreated northward through New Brunswick to New York, thus practically abandoning the state of New Jersey.

PRINCETON, N. J., in Mercer County, fifty miles southwest of New York City and ten miles nearly north of Trenton, is on the Pennsylvania Railroad and the Delaware & Raritan Canal. It is not a manufacturing town, but is famous as a great educational center, the home of Princeton University (which see). Its streets are beautifully shaded, and there are many fine colonial mansions. The place was settled about 1696, and was named Princeton in 1724. Here, on January 3, 1777, occurred the Battle of Princeton (see PRINCETON, BATTLE OF), an audacious and successful venture of General Washington. Population, 1930, 6,992.

PRINCETON UNIVERSITY, a university located at Princeton, N. J., founded by the

Presbyterian Synod of New York in 1746 as the College of New Jersey. The school was originally established at Elizabethtown. In 1748 it was moved to Newark, where it remained until its permanent location at Princeton. On the one hundred fiftieth anniversary of its founding, the college of New Jersey became Princeton University. As now organized, the university has scientific and academic courses of study, requiring four years for completion, and graduate courses, which constitute the university work in all departments. It maintains laboratories, astronomical observatories, and museums of geology and archaeology, biology, morphology and historic art. The general library contains over 500,000 volumes, and there are special libraries connected with the laboratories. The faculty numbers about 250, and the enrollment is over 2,500. The endowment is about \$15,000,000. While nonsectarian, this school is conducted under the auspices of the Presbyterian Church, under which it has acquired a leading influence. Many notable men have been associated with it, including two United States Presidents—Grover Cleveland, a lecturer and trustee for ten years, and Woodrow Wilson, its president from 1902 to 1910.

PRINTING, the art of stamping letters, figures or other characters upon paper, cloth or other material. In its ordinary sense the term means the impressing of characters upon paper.

Processes. Printing includes the three processes of composition, makeup, or imposition, and press work. As the first is now practiced it is necessary to add to these, stereotyping and electrotyping, each of which is described under its appropriate title.

Composition. The first step in printing consists in setting the type, or *composition*. Formerly all type was set by hand, but now only in certain kinds of display printing and in small country offices is any type set in this way. Instead of the old-time compositor and his case the linotype and the monotype are employed. As the type comes from the machines it is arranged in galleys and proofs are taken for correction.

Make-up, or Imposition. This process includes arranging the type into pages, putting in the head lines, page numbers and running titles. It is done on a stone or on an iron-topped table, and the workman who does it is known as the *stoneman*. When made into pages, the type is placed in an iron frame,

called the *chase*, and is wedged in so tightly that the single types cannot fall out when the chase is moved. The chase and type, when arranged for printing, constitute the *form*. The size of the form varies from 1 page to 128 pages, according to the size of the page and the work. The most common sizes contain 16 or 32 pages. The pages are so arranged that the right numbers will face when the sheet is folded. Only small editions of papers and circulars are now printed directly from type. All others are printed from stereotype or electrotype plates, and when this is done the type, as soon as made into pages, is sent directly to the foundry. The plates are then placed in the form.

Presswork. The actual printing is done on the printing-press, which is a machine for pressing the paper down upon the face of the type. The type is inked by running rollers over the form just before the paper is pressed down upon it. The paper is fed into the press in single sheets or from a roll, according to the plan of the press and the kind of printing. Circulars, books, pamphlets and country newspapers are printed from sheets, but large newspapers and magazines which have a large circulation, are printed from a roll. As the roll is printed it is cut into sheets, which are folded by a machine. The modern newspaper and magazine presses do this work very rapidly, some of them having a capacity of 150,000 copies of twelve-page papers per hour. Circulars, job work and most country papers are printed on small presses that may be run by power or by hand, as desired.

Color Printing. Printing-presses are constructed which will print in three or more colors, and by their use inexpensive colored pictures are produced. Many of the large city dailies now have in service expensive presses fitted for color work, and on these the colored supplements and special color sections of the Sunday edition are printed.

Color printing of this sort is not very satisfactory, since the pictures produced are more or less crude. In periodicals of a high grade and in books, we find, however, exquisite colored pictures. These are made by what is known as the *three-color* and the *four-color* process. In the three-color process three colors—red, blue and yellow—are printed over each other, and in the four-color process black is added. These colors so overlap as to produce the variety of tints necessary to complete the picture. Color print-

ing of this sort requires a high degree of skill, for each color must exactly overlie the others; the variation of the slightest fraction of an inch will mar and may ruin the picture. The color prints in this work were made by the three-color process.

History. The origin of printing is unknown. It is probable that the Egyptians and Babylonians engraved characters on precious stones, which were set in rings or other jewels and used for the purpose of impressing their signatures upon official documents. Some assert that the Romans knew the art of printing, but would not use it because the authorities believed that the spreading of intelligence would lead to uprisings among the people. As far as definitely known, however, the first printing was done by the Chinese during the last century before the Christian Era. These people used engraved blocks, instead of type, and they still continue to print by this method. There has been a great deal of dispute over the invention of printing with movable type as we know it to-day. The Germans claim that Johannes Gutenberg was the inventor, while the Dutch assert that this honor is due to Laurens Coster of Holland. The weight of evidence seems to be in favor of Gutenberg, and he is now generally considered to have been the inventor, since he was the first to establish printing on anything like a scientific basis.

The exact date of the invention of printing is not known, but it occurred sometime between 1424 and 1448. Gutenberg's printing office was at Mainz, Germany, and the first book printed was a copy of the Old Testament, which was completed between 1450 and 1455. This work is now known as the Mazarin Bible, but it is not known whether it was printed by Gutenberg or by Faust, or by the two in partnership. After Gutenberg's death the work was continued by John Faust, who kept the process secret until Mainz was captured in a war and the workmen were obliged to flee. These printers soon set up establishments in other cities, and by the end of the fifteenth century there was a printing office in nearly every important city of Europe. Printing was introduced into England by William Caxton in 1477.

The first printing press in America was set up in the City of Mexico sometime between 1540 and 1550. The first press in the United States was established at Harvard College, Cambridge, Mass., in 1638. This press is of

great historic interest. The first article printed on it was the *Freeman's Oath*, the second was an almanac and the third was the first edition of John Eliot's famous *Indian Bible*. This was also the beginning of what is now the University Press, one of the largest and best-known printing establishments in the world. Presses in other colonies followed, and within the next hundred years each had one or more printing establishments. After the Revolutionary War the printing industry in the United States started anew, it has reached in recent years an annual volume of \$2,500,000,000.

Related Articles. Consult the following titles for additional information.

Book	Gutenberg	Newspaper
Bookbinding	Linotype	Printing Press
Caxton	Lithography	Stereotyping
Electrotyping	Monotype	Type



The Gutenberg Press

PRINTING PRESS, a machine for printing upon paper or other material. The necessary parts of a printing press are the *bed*, for holding the type form; a device for inking the type; a *platen*, for pressing the paper upon the type; the frame for holding these parts, and the necessary gear for operating them.

The first printing press was a modification of the wine press and was a very crude affair, consisting of a bed, upon which the forms were placed; a board for a platen, and a screw, for pressing the platen down upon the type. The frame was of wood and rudely constructed. The type was inked with a leather ball, stuffed with wool. The paper was then laid upon the form and a platen placed over it, after which the form was shoved under the screw, which was turned with a lever. This was the press designed by Gutenberg and used for several centuries with little or no improvement. The first improvement in Gutenberg's press consisted in substituting iron for wood in making the frame; the next was in adding a spring to lift the platen when the screw was released, and the next, and by far the most important, in substituting a lever for the screw in operating the platen. Inking devices and the crank and pulley arrangement for moving the form were added.

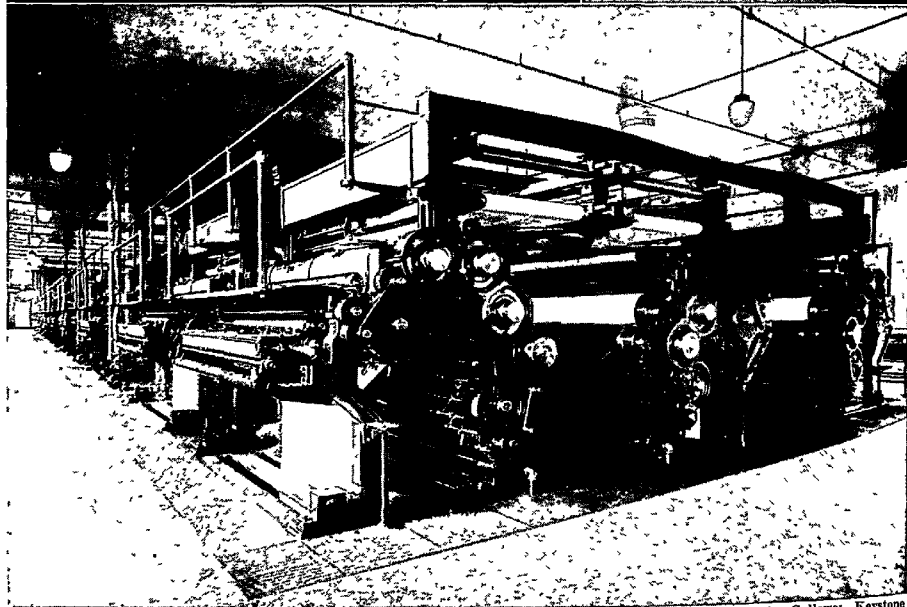
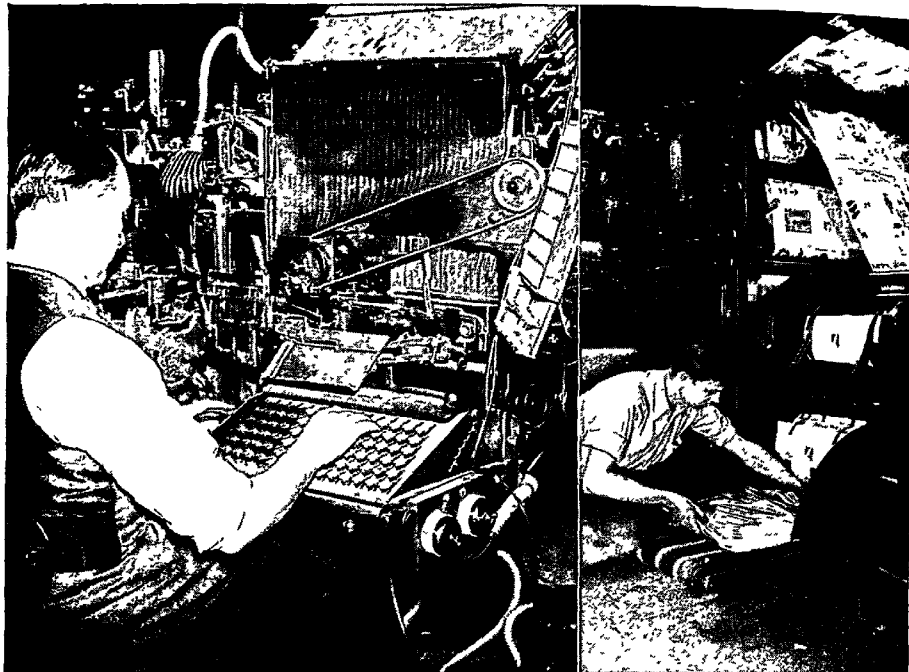


Keystone

WHERE THE MARVEL OF MODERN PRINTING HAD ITS BEGINNING

Below, the original Gutenberg press, the world's first printing machine. The workman in the first illustration is seen in a costume of the Gutenberg period. At left, another workman setting type.

[See over]



Living Gallows, Keystone

MECHANICAL PERFECTION IN NEWSPAPER MAKING

Every great newspaper sets its type on thirty to seventy linotype machines. Below, one of the presses which prints a metropolitan newspaper. The paper is fed into the press from great rolls, and the papers emerge (see right, above) printed, folded, and counted.

The Cylinder Press. The cylinder press was the next great improvement in the printing press. It was invented by Friedrich Koenig in 1806 and was first used in 1814 in printing the *London Times*. This press takes its name from the large cylinder which constitutes the platen. As it revolves this cylinder seizes the paper and impresses it upon the type. The form is placed on a movable bed, so that it moves back and forth under the platen and the ink rollers at each impression. A good press of this pattern will make from 1,000 to 1,500 impressions per hour. The old-style cylinder press is a common object in all country printing offices.

The Newspaper Press. The most recent development in the printing press is in the invention and perfection of what is known as the web perfecting press, invented by Mr. Richard Hoe of New York in 1871. In presses of this pattern the forms are cylinders, and the stereotype plates are made in half-cylinders and clamped in position on the press. These cylinders are so placed that they print both sides of the sheet at once, and also print the paper from a roll, or web. The press is so planned that any number of parts can be added, so that a quadruple, a sextuple or an octuple press can be constructed as desired. These additions are made either by setting the presses side by side, or by placing one above the other, which is the more common plan. The work of one of these presses is so rapid that it is impossible for the untrained observer to follow the paper as it rushes through the machine. The double-octuple press used in printing the largest newspapers prints from eight rolls of paper, each roll containing five miles of paper and double the width of the ordinary newspaper. This press prints, cuts, folds and delivers in quires, 54,000 copies an hour of a paper containing thirty-two pages. (See *NEWSPAPER*, subhead *Printing*).

While the web perfecting press was constructed for the purpose of printing large daily papers, it has since led to the construction of other patterns for the use of large magazine and book establishments, and now some of the best work in the country is produced on presses of this pattern. See *PRINTING*.

PRISM, *priz'm*, a geometric solid, two of whose faces, called *bases*, are equal parallel polygons, and whose other faces, called *lateral faces*, are parallelograms. When the

edges of the lateral faces are perpendicular to the bases, the prism is a *right prism*; otherwise it is *oblique*. The area of the surface of a prism is equal to the perimeter of the base (that is, the sum of the length of its sides) multiplied by the altitude (that is, the perpendicular distance between the two bases). The volume is equal to the area of one base multiplied by the altitude. In optics, the prism is a transparent body, usually glass, with two plane faces not parallel to each other.

PRISON, *priz'n*, a penitentiary under the management of a state, provincial or national government, for the confinement of adults, male and female, who have committed serious offenses against society, and who have been sentenced for periods varying from one year to the remainder of their lives. Jails are local institutions for the confinement for short terms of those who have committed minor offenses, and those held for trial. In jails the short-term prisoners are kept in idleness, but in prisons labor is provided.

Management. Every penitentiary is under the management of a *warden*, who is appointed by the governor, or by a board of prison commissioners. Under the warden are deputy wardens, superintendents, a chaplain and guards. Since the warden determines in a large measure the policy of the prison, he should be a man with special aptitude and training for his position, and his assistants should be in perfect harmony with him in carrying out whatever policy he may adopt.

The best results are obtained when the discipline is strict, but kind. While the first purpose of confining the prisoner is to punish him for his crime, the state should never lose sight of the fact that he is a man who may be reformed and made a useful citizen. Unjust or harsh treatment works against reform.

Construction and Equipment. Every prison contains offices, workshops and a large number of cell rooms, constructed of steel or concrete, and arranged in tiers, one above another. In these cells the prisoners are confined when not at work or engaged in some form of recreation. The buildings are enclosed with a high wall, on the top of which armed guards are maintained day and night. The wall usually incloses sufficient ground to give the prisoners opportunity for exercise in the open air. The workshops are equipped for whatever occupations are carried on. So far as possible each prisoner is assigned to

the trade he has worked at on the "outside." All are required to work, but for a serious breach of discipline a prisoner may be punished by being placed in solitary confinement, without labor, for a specified period.

In some states, prisoners are allowed a small wage, and in some they are allowed to work after regular hours at private tasks and earn money. All earnings are held by the warden and credited to the prisoners, or they are sent to the families or other relatives, as the prisoner requests. In many prisons the convict labor system is in force.

A good library is provided; there are chapel exercises on Sunday, and occasional entertainments are given. The prison *chaplain* may exert a greater influence over the men than any other official connected with the institution.

Prison Reform. Since the beginning of the nineteenth century much has been done to improve the condition of prisoners. Juvenile offenders are no longer confined with old and hardened criminals, but are sent to industrial schools or reformatories. The sanitary conditions of most prisons have been greatly improved, and methods of discipline have become more humane. Some institutions have been very successful in leading prisoners to reform, the most notable among these being the Elmira Reformatory, at Elmira, N. Y., opened in 1877, for the treatment of first offenders under thirty years of age. The principal features of the Elmira system, which have been largely adopted elsewhere, are indeterminate sentences, the classification of prisoners into three classes under the mark system, and discharge on probation, under supervision.

In most prisons those prisoners whose conduct is satisfactory are granted greater freedom of movement, and more general conversational privileges. Such prisoners are called *trusties*, and are put upon their honor. Some prisons have large farms on which trusted prisoners are sent to work under supervision; prison camps to which trusted prisoners are sent for constructing roads, under a very small guard, have proved successful. The confidence placed in these prisoners is seldom betrayed.

Related Articles. Consult the following titles for additional information:

Convict Labor	Juvenile Court
Crime and Criminology	Parole
Indeterminate Sentence	Sociology

PRISONERS OF WAR, soldiers or men of the navy captured from the enemy in time of war. In ancient times prisoners of war became the slaves of their captors. According to the convention of the peace conference held at The Hague in 1907, prisoners of war are declared merely in the custody of the nation which captures them, and while confined are to be treated as well as its own soldiers. Surgeons, chaplains and hospital attendants of the Red Cross are exempt from capture as prisoners of war. Prisoners of war are obliged to make themselves useful, and are protected by rules of international law against unlawful acts against their persons. In every war many stories are current as to inhuman treatment of prisoners. Because of the gigantic character of the World War, it is probable that it recorded more examples of atrocities than any other conflict.

PRIVATEER, *pri va teer'*. Formerly it was customary for the government of a nation at war to engage and arm privately-owned vessels of a neutral country to prey upon the ocean commerce of its enemy. Such a vessel was called a *privateer*, and the commission under which it operated was known as a *letter of marque*. The practice of privateering led to much abuse, and there were many non-commissioned ship owners among neutrals who, taking advantage of a war situation, preyed upon the merchant ships of either or both belligerents as opportunity offered, thus engaging in high-seas robbery and piracy. Therefore, by the declaration of Paris, in 1856, the great European powers agreed to abandon the practice of employing privateers. The United States was not a signatory to the document, but its position in subsequent wars has been in accord with the decision of the convention.

PRIVY COUNCIL, originally the council of state of the British sovereign, convened to discuss matters connected with the public service and for the honor and safety of the realm. As it exists at present, the number of members of the Privy Council is indefinite; they are nominated by the sovereign at pleasure. The list of Privy counselors now embraces besides the members of the royal family and the members of the Cabinet, the archbishops and the bishop of London, the great officers of state, the Lord Chancellor and chief judges, the Speaker of the House of Commons, the commander in chief and some other persons. Officially at the head is the Lord

President of the Council, who is appointed by patent, and who manages the debates and reports them to the sovereign. See ENGLAND, subhead *Government*.

In Canada. Britain's overseas dominions copied the mother country's governmental devices in many respects. One of these was the adoption of the Privy Council. The British North America Act provides that the Council, which aids and advises the Governor-General, shall be known as the "King's Privy Council for Canada." As in England, the terms "Cabinet," "Ministry," "Administration" and "Government" are popularly applied to those members of the Council who are at the head of affairs for the time being. It should be understood that Privy councillors, even when no longer Ministers, retain honorary rank. When the Governor-General appoints his advisers, he first determines who shall be Premier; with the Premier's assistance the other Ministers are then chosen. The number of members of the Cabinet varies from fifteen to eighteen or twenty heads of departments and three "Ministers without portfolio" (that is, without departments) besides the President of the Privy Council. Ministers in charge of departments receive a salary of \$10,000 a year; the president of the council receives \$15,000. The permanent head of each department is a deputy-minister, appointed by the Crown and holding office regardless of political affiliations.

PRIVY SEAL, an official seal which formerly was affixed to public documents in Great Britain. It was a prerequisite of the Great Seal, and was used on documents of minor importance which did not require the Great Seal. Although the use of the privy seal was discontinued in 1884, the office of custodian still exists with the title Lord Privy Seal. The incumbent ranks as the fifth great officer in the state, and usually has a seat in the Cabinet.

PRIZE FIGHTING, fighting with the fists, with or without gloves, in public for prize money. The chief difference between a prize fight and a sparring or boxing match is that in a prize fight the participants intend to knock each other out for a reward, while in a boxing match there is no such intention, but it often occurs. The prize fight is a relic of the past ages. It was common among the Greeks and Romans, and professional fighters were common in England through the Middle Ages. Modern prize fighting is

conducted according to the rules for boxing. In the United States it is generally considered a brutal sport, and in most states it is forbidden by law. See **BOXING**.

PROBATE, the proof before the proper court that an instrument offered to be recorded is the last will and testament of the deceased person whose act it is alleged to be. The party presenting and upholding the instrument is termed the *proponent*, and the party disputing, if any, the *contestant*. In the United States, generally speaking, proofs cannot be taken until notice has been issued by the judges to all the parties interested to attend. On the return of the notice, the witnesses are examined and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate*; if against the will, he rejects it and pronounces the sentence of *intestacy*. The functions of this branch of the judiciary are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists or when no executors are named. In most states and in the Canadian provinces special courts called *probate* or *surrogate* courts are maintained for the purpose of settling estates. See **WILLS**.

PROCEDURE, in law, the method of proceeding in a lawsuit throughout its various stages, civil procedure being the rules for conducting a suit in civil law, and criminal procedure being the rules for conducting a criminal case.

In the United States, when redress is sought for a civil injury, the injured party brings an *action* against the offender, who thereby becomes the *defendant*, the complainant being known as the *plaintiff*. The action is begun by issuing a *writ of summons*, commanding the defendant to *appear* in court. If he fail to do so, an *appearance* is entered for him by the plaintiff. When both parties have entered an appearance they are said to be *in court*, and the suit may be commenced. The next stage is the *pleadings*, or the statements in legal form of the position of the two parties to the suit. Next the *issue* is argued. This may be a matter of law, the facts being admitted, in which case it is called a *demurrer*, or it may be a question of fact. In the former case the decision rests with the *judge*; in the latter, with the *jury*. In a jury trial, after the evidence has been submitted, the judge sums up the law bearing

upon the issue, the jury retires, enters a *verdict*, that is, comes to a conclusion, and the judge then pronounces *judgment*, that is, announces the decision and the consequences which the court has fixed to the act.

In criminal cases the first step is the *arrest* of the one charged with the crime; that is, he is taken into custody of the law. He is then brought before a judge or magistrate to be *examined*, and he may be held to answer for his action to the grand jury, or he may be dismissed for lack of evidence; if the evidence warrants it the grand jury brings in an *indictment*, and the accused is held for *trial* before a *petit jury*.

Pending trial, he is either allowed his freedom upon giving *baul*, or *bond*, for his appearance, or he is committed to jail. If the grand jury enters indictment, the prisoner is held for trial before a petit jury; if found not guilty, he is discharged; if found guilty, he is sentenced to punishment. In the latter case an *appeal* may be granted, that is, the right of a defeated party to carry his case to a higher court for determination, on account of a flaw in the conduct of the case at the earlier trial.

Related Articles. Consult the following titles for additional information:
 Appeal Demurrer
 Arrest Jury and Trial
 Bail by Jury
 Court Writ

PROCTER, ADELAIDE ANNE (1825-1864), an English poet, born in London. Assuming the name of Mary Berwick, she became a contributor in 1853 to *Household Words*. This periodical was edited by Charles Dickens, who became interested in the young poet and aided her in gaining public recognition. Later poems were published in *All the Year Round*. A collection of her verses, nearly all of which had appeared in these two magazines, was issued in 1858. A later edition of them contains her biography, written by Dickens. Her best known poem, *The Last Chord*, has been set to music.

PROCTOR, RICHARD ANTHONY (1837-1888), an English astronomer, one of the first scientists to adopt a simple style of exposition in writing for the general public. After graduating from Saint John's College, Cambridge, he began to devote himself to astronomy as a profession. He contributed numerous articles to magazines, including *The Popular Science Review*, and he edited the *Proceedings of the Royal Astronomical Society*. He was for years a popular lec-

turer on astronomy in England and America. In 1881 he settled in the United States, where he remained the rest of his life. Among his books are *Saturn and His System*, *Half Hours with a Telescope*, *Other Worlds than Ours*, *The Romance of Astronomy*, *Hereditary Traits*, *The Great Pyramid and Nature Studies*.

PROFIT SHARING, a system of compensation by which employees are given a share in the profits of a firm in addition to their regular wage. The additional payment may be in cash, paid at stated periods, as at the end of the year; it may be in shares of stock in the company; or in the form of an insurance fund, from which the workman derives a pension in his old age, or his family a cash payment in case of his death. Of all these plans the dividend shared by both employer and employe seems to be the most satisfactory.

The first record of profit sharing is that of Le Claire, a house painter in Paris, who began his experiment in 1842. Le Claire found that his plan led to increasing the incomes of both employer and employe, through the better quality and greater amount of work accomplished. The success of Le Claire's experiment led to the adoption of similar plans by other firms, and profit sharing has become quite common in France, England and the United States. Many industries, stores, and offices practice profit sharing in fact but not in name; they distribute their extra favors annually under the designation *bonus*, which need not be a fixed per cent of profits.

The advocates of the plan claim that it offers the following advantages:

1. It insures justice for both capital and labor.
2. It increases the efficiency of the workmen.
3. It decreases waste.
4. It lessens industrial unrest by harmonizing the interests of employers and employees.

Labor unions, on the other hand, look upon profit sharing as only a substitute for real reform, claiming that it stimulates the workmen to greater production without giving them an equitable portion of the results. Some of them also look upon it as philanthropy and much prefer that a higher wage be paid outright.

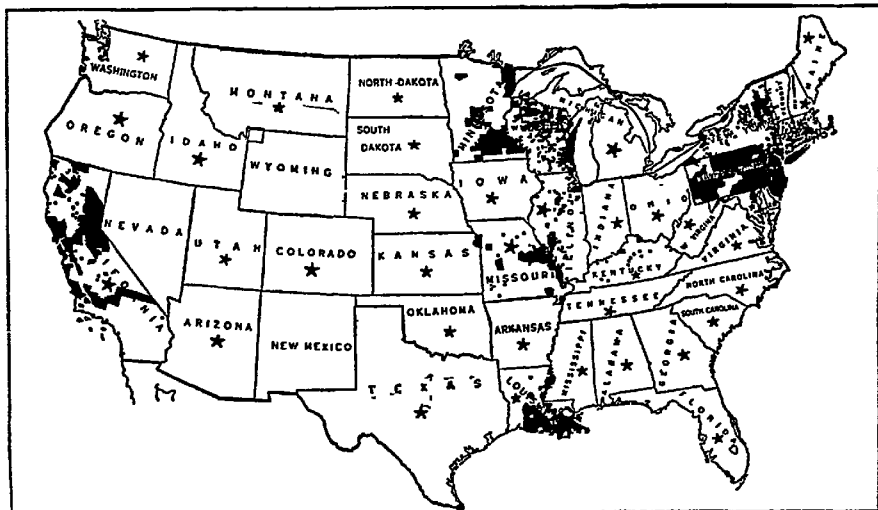
PROGRESSION, in mathematics, a regular increase or decrease in a series of numbers due to a common difference, or to the application of a constant law. The first of

these definitions applies to *arithmetical progression*, an example of which is 2, 4, 6, 8, 10, the increment being 2. The second refers to *geometrical progression*, for example, 2, 4, 8, 16, 32, 64, in which the series progresses in a constant ratio, the constant multiplier being 2.

PROGRESSIVE PARTY. See **POLITICAL PARTIES IN THE UNITED STATES.**

PROHIBITION, the name applied generally to one of the greatest moral and economic movements of modern times. Prohibition has come to mean, specifically, abolition by law of the privilege of manufacturing and selling alcoholic beverages. It is the direct result of

first state in the Union to establish prohibition as a permanent state policy. At the close of the Civil War it was the only "dry" state, but within a decade the national movement to make liquor selling illegal began to take form. In 1872 the first national convention of the Prohibition party was held, and two years later the Woman's Christian Temperance Union was organized. These organizations did not wield much political influence, but they were excellent channels for propaganda against drink. A society which secured direct results through political action was the Anti-Saloon League, organized in 1893. It worked on a non-partisan ba-



PROHIBITION AT THE TIME THE AMENDMENT WAS ADOPTED

The states in white had already adopted state-wide prohibition. The black areas in otherwise white states represent saloon areas, the remainder of such states being under prohibition. The first thirty-seven states to ratify the amendment, thirty-six being necessary, are marked by stars. The District of Columbia, Alaska, the Canal Zone, Porto Rico, Hawaii and the Virgin Islands were also prohibition territory before the passage of the amendment.

the many serious abuses connected with the sale of whisky, wine, beer and similar beverages. The liquor traffic has been attacked from the standpoint of religion, morality, health and economics, often successfully over small areas.

Prohibition in the United States. In the American republic the abolition of slavery was the paramount moral issue of the period before and during the Civil War. After the war the crusade against liquor held first place in public interest. Maine, passing a law which became effective in 1851, was the

sis, and for town or county local option as well as for state and national prohibition.

After 1880 prohibitory laws began to be passed in the Middle West, and early in the new century the tide definitely turned against liquor. The situation at the beginning of 1919 is shown by the accompanying map. The friends of prohibition also pressed their cause in the national Congress, and in August, 1917, the Senate passed a resolution to submit to the states for ratification a Constitutional amendment (the eighteenth) making the United States "dry" territory. In Decem-

ber the House concurred in this action, though slightly modifying the Senate resolution. The amendment was ratified by the required number of state legislatures by January, 1919, and the Eighteenth Amendment became effective January 16, 1920.

Prior to the adoption of the Eighteenth Amendment the Government had taken measures to restrict the manufacture and consumption of alcoholic liquors. In 1918, as a war measure, Congress passed a bill which was signed by President Wilson, the main purpose of which was to stimulate food production, but which contained a rider making the country entirely dry after June 30, 1919. It was specified that this condition should continue until demobilization of the army. Sentiment in favor of these war measures was largely responsible for the ratification of the Amendment before the June date was reached, making it ineffective.

In the years that followed, strong protests were made by large sections of the people against the enforcement of the law on the claim that it was sumptuary legislation and an infringement on personal rights. There developed a large illicit trade in alcoholic liquors, manufactured in secret and smuggled from abroad.

The large profits to be made attracted a class of lawbreakers who with little effort at secrecy sold illicit liquor. Enforcement agencies were to a degree ineffectual, and the government could not profit from the illegal traffic. In February, 1933, Congress submitted to the states a new Amendment (it became the Twenty-first) to repeal the Eighteenth. In the same year, on December 5, the necessary thirty-sixth state had ratified it, and national prohibition was killed, after being in effect 13 years, 10 months, 19 days.

Prohibition Elsewhere. Liquor consumption was curtailed in Europe during the war because of the shortage of foodstuffs, but in practically all European countries the drinking of beer and wine continued. However, liquors are sold under restrictions, and there is in most sections a growing prohibition sentiment.

Quite early in the war the czar of Russia prohibited the sale of vodka, the national drink of the Russians. After the revolution the Soviet authorities restored the sale of vodka, but made the traffic a state monopoly. During the war all of the Canadian provinces except Quebec adopted temporary prohibi-

tion; after the war, by referendum vote, these provinces abandoned absolute prohibition, and placed the sale of alcoholic liquors under strict government regulation.

PROHIBITION PARTY. See **POLITICAL PARTIES IN THE UNITED STATES.**

PROMETHEUS, *pro mé'thuse*, in Greek mythology, one of the Titans, brother of Atlas and Epimetheus and father of Deucalion. His name means *forethought*, as that of Epimetheus signifies *aftersight*. He wanted to bestow some great gift on man, and stole fire from heaven and brought it to earth, thus rousing the anger of Jupiter, who to punish him had Prometheus chained to a rock. Here an eagle came every day and devoured his liver, which during the night grew again. This torture Prometheus endured for centuries, until he was set free by Hercules.

PROMISSORY NOTE, a written promise to pay a certain sum of money, either on demand or at a future fixed or determinable time. If it is payable to the order of a person or to bearer, it is negotiable. The following is the most common form of a negotiable promissory note:

\$500

CHICAGO, ILL., March 9, 1947

Sixty days after date I promise to pay C. D., or order, five hundred dollars, with interest at the rate of six per cent per annum, for value received.

A. B.

This note will be negotiable when endorsed by C. D. If it is sold or transferred without his endorsement, the person to whom it is transferred accepts only such rights in it as C. D. possesses. The one who makes the promise is the *maker* of the note, the one to whom the promise is made is the *payee*. See **NEGOTIABLE INSTRUMENTS.**

PRONG'HORN, a beautiful little American animal about the size of a goat and shaped like a deer. The adult is four and a half feet long and three feet high. Its hair is yellowish-brown above and white beneath; the cheeks are light; the rest of the head, which is gazellelike in shape, is dark. The conical horns, about a foot long, are covered with a sheath, which is shed annually. The animal is timid and suspicious and very fleet-footed, outrunning the swiftest hounds. Formerly large herds of pronghorns ranged the western plains; then for years they were very scarce, but large numbers are now found in the Northwest, from Wyoming to Oregon. Wherever found, they are known incorrectly as

antelope. There are pronghorn reservations in Nevada, Oregon, and Canada maintained by the national governments

PRONOUN, in grammar, the part of speech that represents a noun, which is its *antecedent*. The pronouns in commonest use are of the following classes: *personal*, I, thou, you, he, she, it, with their various case and number forms; *conjunctive*, or *relative*, who, which, what and that; *interrogative*, who, which and what; *indefinite*, some, any, much and the like; and *demonstrative*, this, these, that, those.

PROOF AND PROOF READING. In printing, *proof* is a rough impression taken from the type for the purpose of correcting errors which appear in the composition. In printing books and periodicals of a high class, revised proofs are taken so that the author may be sure that all errors have been corrected.

Proof Reading. The corrections to be made on a proof of printed matter are marked on the margin; and for this purpose various signs or symbols have been universally adopted. The following specimen proof exhibits the application of most of these signs:

Explanations of the accompanying symbols and other marks are as follows:

1, A wrong letter After every mark of correction a line should be drawn, to prevent its being confounded with any other in the same line 2, A word or letters to be transposed Where letters are to be transposed they may be stricken out and rewritten in their proper sequence in the margin, like a correction, or they may be underscored, with the marginal "tr" as in the illustration 3, A space wanted This mark is used when the spacing is insufficient 4, A space or quadrat sticking up 5, Alteration of type One line drawn under the word for italics, two for SMALL CAPITALS, three CAPITALS 6, Correction or insertion of marks of punctuation 7, A word struck out, but afterward approved of (Lat. stet, "let it stand") 8, A turned letter 9, An omission 10, A letter of a wrong font 11, A word or letter to be deleted (Lat. deletus, p p of delere, to destroy) 12, Alteration of type 13, Begin new paragraph 14, Insertion of a clause 15, A space to be removed or diminished 16, A wrong word 17, When letters do not line evenly at the base 18, Mark for a hyphen 19, Do not make a new paragraph 20, The manner in which the apostrophe, inverted commas, the star and other references, and superior letters and figures are marked

The immediate object of a "reader" or corrector of the proof is to observe and mark every error and oversight of the compositor,

with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation and abbreviations, and in many cases to the verification of quotations, dates and proper names.

To rule the nations with imperial
sway, to impose terms of peace, to
spare the humbled, and to roush the
proud, resigning itto others to de-
scribe the courses of the heavens, and
explain the rising stars, this, to use
the words of the poet of the Æneid
in the apostrophe of Anchises to
Fabius in the Shades, was regarded
as the proper province of a Roman
The genius of the people was ~~equi~~
more adverse to the cultivation of the
physical sciences than that the Euro-
pean Greeks, and seen we have (that
the latter left experimental philosophy
chiefly in the hands of the Asian and
African colonists. The elegant litera-
ture and metaphysical speculation of
Athens, her histories, dramas, epics,
and orations, had a numerous host of
admirers in Italy, but a feeling of
indifference was displayed to the
practical science of Alexandria (This
repugnance of the Roman mind at
home to mathematics and physics, A
extending from the Atlantic to the
Indian Ocean, from Northern Britain
to the cataracts of the Nile, annih-
lated in a measure all pure sciences
in the conquered districts where they
had ~~had~~ been pursued, and prohibited
attention to them in the mother
country)
Long, indeed, after the age of
Ptolemy, the school in connection
with which he flourished, remained
in existence, &c

When supposed errors are discovered by the reader they should be referred to the author for verification. In case extensive alterations, omissions or additions are likely to be made

1 a
2 tr
3 #
4 |
5 italics
6 /
7 sm caps
8 stet
9 of
10, 11 tr
12 wf
13 ⊙
14 s
15 tr
16 Roman
17 I
18 and its despotism abroad,
19 # 18 =
20 she
21 s
22 -/
23 run on
24 Caps
25 V

by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs or the suppression of those in type should be avoided since such changes cause trouble and expense.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter.

PROPORTION, in mathematics, an equality of ratios, written in a variety of forms, as $\frac{2}{4} = \frac{8}{16}$, $2:4=8:16$ or $2:4::8:16$, but usually read 2 is to 4 as 8 is to 16. The first and last terms of a proportion are called its *extremes*; the second and third terms are called its *means*. The general law of proportions is: *The product of the extremes equals the product of the means*. In the proportion $2:4::8:16$, $16 \times 2 = 4 \times 8$. An extreme of a proportion may be found by dividing the product of the means by the other extreme, as in the proportion $X:4::8:16$, $X = 4 \times 8$, or 2.

16

In arithmetic proportion is sometimes called the *rule of three*, because when any three terms are given the fourth can be found. By the application of algebraic processes to a simple proportion, combinations of the various terms are produced so that new relations between them are shown. For instance, using the proportion $\frac{a}{b} = \frac{c}{d}$, by apply-

ing algebraic processes, such proportions as the following are produced:

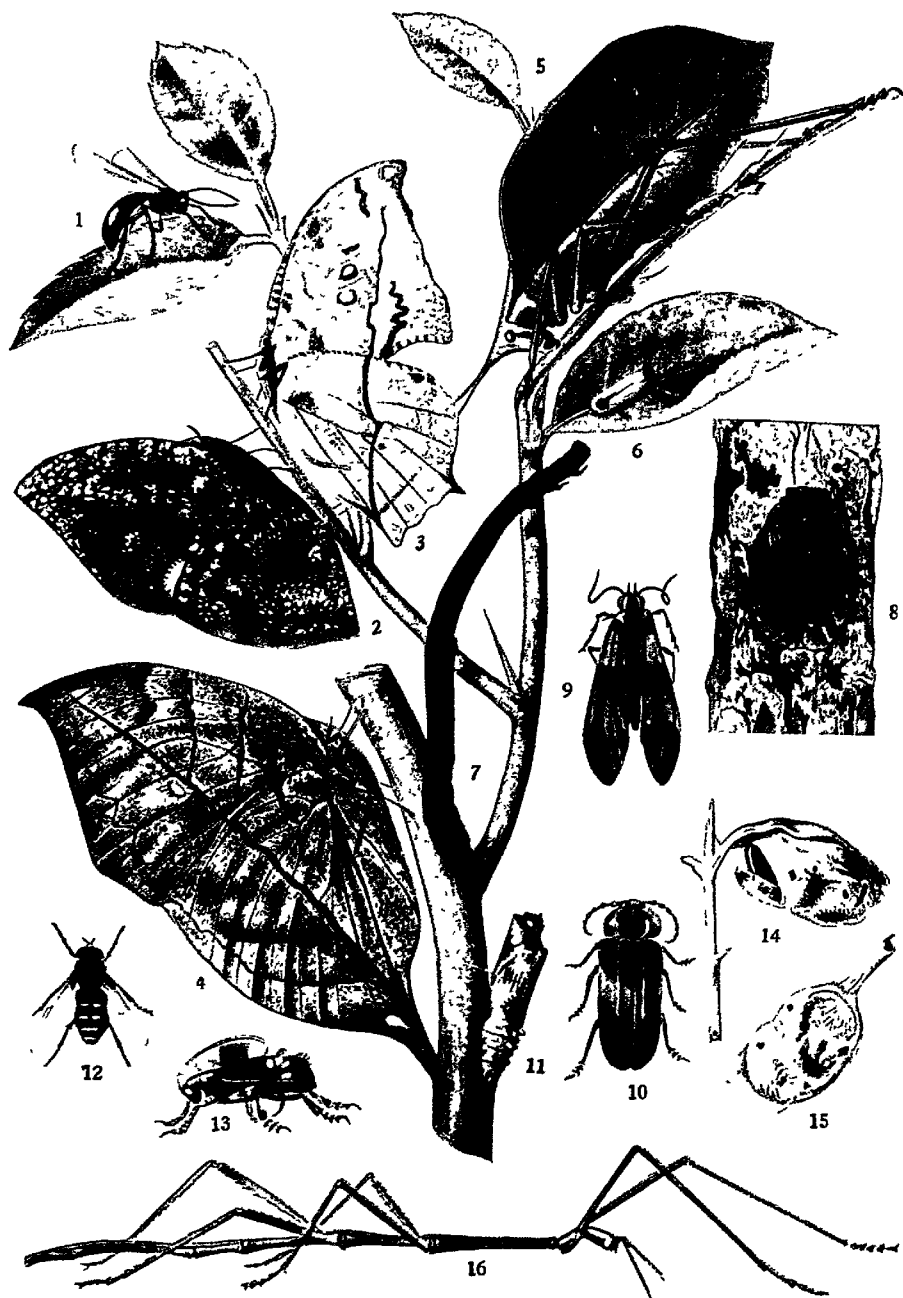
$$\frac{b}{a} = \frac{d}{c}; \frac{a+b}{a} = \frac{c+d}{c}; \frac{a+b}{a-b} = \frac{c+d}{c-d}, \text{ etc.}$$

PROSERPINA, or **PERSEPHONE**, in classical mythology, the daughter of Jupiter and Ceres. One day while gathering flowers in a plain in Sicily, Pluto, the god of the lower regions, saw her as he drove by in his chariot drawn by black horses. He sprang out, seized the maiden and drove away with her, telling her that he intended to make her his queen. In vain she pleaded to be released; down to his underground home he carried her. Ceres sought for her daughter, and when she discovered what fate had befallen her she implored Jupiter to restore her

to earth. He promised on condition that Proserpina had eaten nothing in Hades. When the messenger of Ceres went for Proserpina it was found that she had eaten six pomegranate seeds, and for each of these she was obliged to spend one month each year in Hades, while the other six months were passed on earth. This very ancient myth is a poetic allegory of the change of the seasons.

PROTECTION, in economics, a government policy of assisting home industry, either by offering a bounty on the production of a certain commodity, or by placing such a duty upon the foreign article as will make it cost the consumer as much or more than the domestic article of an equal quality. To illustrate: let it be supposed that kid gloves can be made in France so that they can be sold in the United States at \$1.50 a pair, but it costs \$1.60 a pair to manufacture and sell them in the latter country, at the higher standard of wages prevailing. Without government aid an American manufacturer of kid gloves would have to go out of business, but by placing such a duty on the importation of kid gloves as will make them cost the American purchaser \$1.60 a pair, the government enables the American manufacturer to compete with the French manufacturer. Duties may be simply *protective*, that is, of such an amount that the foreign producer can pay the duty and still compete in the market on nearly equal terms; or *prohibitory*, that is, to exclude foreign competition altogether. See **FREE TRADE**; **TARIFF**.

PROTECTIVE COLORATION AND MIMICRY. Certain plants and animals exhibit a remarkable resemblance to certain other plants and animals, or to the natural objects in the midst of which they live. These resemblances form one of the best means of protection in the life of the plant or animal. Fish, for instance, are dark above and light beneath so they cannot readily be seen by their enemies from above or below. Frogs, snakes or other animals that live in the grass are green. Those animals that live on the desert are colored like the sand and rock. Some species of hare and the weasel have brown coats during the summer and autumn, and white coats during the winter, while the polar bear and snowy owl, which dwell among ice and snow, are white throughout the year. These are a few illustrations of *protective coloration*, so called, because the resemblance of the animal or bird to its sur-



PROTECTIVE MIMICRY—INSECTS

- | | | | |
|--|--|---|--|
| 1, Harmless Brazilian insect resembling a wasp | 6, Moth resembling spot on leaf | 9 and 10, A fly and an offensive beetle | 13, Beetle resembling caterpillar distasteful to birds |
| 2, 3 and 4, Butterflies resembling leaves | 7, Measuring worm that when frightened resembles a dead twig | 11, Cocoon resembling broken twig | 14, Bee's nest |
| 5, South American leaf insect | 8, Brazilian bug resembling bark | 12, A harmless fly | 15, Cocoon |
| | | | 16, Walking Stick |



Field Museum of Natural History

PROTECTIVE COLORATION

The Tiger and Leopard blend into the shadows of jungle grass and leafy foliage; the Polar Bear is perfectly adapted to his surroundings, while the Bongo's queer markings make the bamboo thicket an ideal retreat.

roundings prevents it from being easily seen by its enemies.

Mimicry. Mimicry is the term applied by some authorities to the protective coloration in insects, though other authorities believe that *protective coloration* should be applied to all cases of adaptation of color to surroundings. The following illustrations show some of these peculiar adaptations of coloration in insect and vegetable life:

It is well seen in the leaf insects and in the walking-stick insects. Certain tropical butterflies reproduce the appearance of leaves so closely that even the parasitic fungi which grow upon the leaves are imitated. Some caterpillars resemble the twigs of trees and when alarmed stand rigidly out from the branch to increase the likeness. A few flies, whose larvae are parasitic on bees, by closely resembling their host are able to enter the hives and deposit their eggs. A South American moth has a most accurate resemblance to a humming bird; while the cacti of America and the poisonous euphorbias of Africa might easily be mistaken for each other, though widely different in structural character.

PROTECTORATE, in international law, a term used to denote the relation of a stronger country to a weaker one, wherein the stronger agrees to protect and defend the latter from aggression of other powers, and to give it counsel in the solution of difficult problems. The relations of the protectorate are usually fixed by treaty, and the country under protection is usually allowed to administer its internal affairs without interference, but it must submit its international affairs to the protecting government for approval. Kenya, Somaliland and Bechuanaland, in Africa, are protectorates of Great Britain.

PROTEIDS, *pro'teids*, a name given to substances similar in composition to protein, that is, consisting of carbon, hydrogen, oxygen and nitrogen, sometimes united with sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential foodstuffs.

PROTEINS, *pro'teins*, foods composed of carbon, hydrogen, nitrogen and oxygen. The same name is given to the nitrogenous material present in the foods, which serve the purpose both of repairing and building up

the body and of furnishing heat or energy. See Food.

PROTEROZOIC *pro'ter o zo'ik* ERA, one of the grand divisions of geologic time, intermediate between the Archeozoic Era preceding it, and the Paleozoic Era, following. Great masses of both sedimentary and igneous rock were laid down in this era. In North America the rock systems formed are named, according to locality, the Huronian, that north of Lake Huron; the Keweenawan, that on the southern shore of Lake Superior; the Animikean, that occupying parts of Wisconsin and Minnesota. The last contains the largest deposits of iron ore in the world.

It is believed that life was abundant and varied during the Proterozoic Era, though fossil remains of it are rare. See GEOLOGY.

PROTESILA'US, in Greek mythology, king of Phylace, Thessaly, and son of Jason. He married Laodamia, and soon afterwards set off for the Trojan War. An oracle had foretold that the first Greek to land on Trojan soil would be the first to be slain. When the other chiefs held back, Protesilaus leaped ashore and was instantly killed. Laodamia, overwhelmed with grief, persuaded the gods to grant the return of Protesilaus to earth for three hours. At the end of that time, rather than be parted from him again, she killed herself.

PROTESTANT EPISCOPAL CHURCH. See EPISCOPAL CHURCH; ENGLAND, CHURCH OF.

PROTESTANTS, *pro'tes tants*, those who adhere to any of the Christian churches that grew out of the Reformation. The followers of Luther constituted the first large body of non-Catholic Christians, but these were not designated Protestants until 1529. In that year prominent representatives of the Roman Catholic Church convened at Speyer and issued a decree enjoining those states that had adopted the new faith to return to Catholicism. Many princes and imperial cities protested against the decree, and from this circumstance became known as *Protestants*. In time the name came to be used to designate anyone who adhered to the doctrines of the Lutheran Church, the first of the protesting groups, formed at the time of the Reformation and named for Martin Luther, and also to other Churches that were organized among the so-called Protestant groups during the centuries that followed. Many of these Churches differ in creed only

in small degree, and recent years have emphasized the lessening importance of doctrinal differences. As evidence of the broadening of religious minds, in 1918 there was formed a union of three Lutheran bodies in the United States, which took the name United Lutheran Church in America; in 1925 nearly all of the Methodist, Presbyterian, and Congregational churches of Canada united in one denomination called the United Church of Canada, and in 1936 the first vote was taken in the general conferences affected to bring about the union into one great Church of the Methodist Episcopal Church, the Methodist Episcopal Church South, and the Protestant Methodist Church.

Related Articles. See, particularly, in these volumes, REFORMATION, LUTHER, MARTIN, METHODISTS, PRESBYTERIANS, CONGREGATIONALISTS, LUTHERANS, and other Churches listed in the article RELIGION.

PROTOPLASM, *pro'toh plas'm*, a substance, colorless, transparent, and jelly-like in appearance, called by Huxley "the physical basis of life" and by another "the start of life." This substance, the unit of life, is the cell, which is only a very minute bit of protoplasm surrounded by a slightly more solid shell, or retaining wall. The protoplasm content is composed of two parts—an inner, or nucleus, and an outer, the cytoplasm; the inner is slightly more dense in substance than the outer. The cell covering, or membrane, affords protection to the protoplasm and relates it to functions having to do with food and the elimination of waste material rejected in the building processes.

There are properties of protoplasm that indicate the fact of life within the cell. It has the power of spontaneous motion; it responds to stimuli of various kinds; it has the power of assimilation, for it can take up new material and build it into its own substance, and it reproduces its kind. How the processes of life develop within the cell and why protoplasm is the fundamental essence of life are two facts which science has not been able to explain.

PROTOZOA, *pro'toh so'ah*, the lowest of the seven groups into which the animal kingdom is divided. All protozoans are simple, one-celled animals, mere particles of protoplasm, usually of microscopic size. The lowest forms (amoeba) have no specialized organs, but, notwithstanding, they are able to perform all the functions necessary to animal

life; they eat, move about, excrete waste and reproduce their kind. In some of the higher forms (infusoria) there are hairlike processes which aid in locomotion, and in some there is a rudimentary mouth. Most of the ocean protozoans are enclosed in shells, some of which are marvelously delicate and exceedingly beautiful in color (see FORAMINIFERA). Some of the protozoans reproduce by *fission*, that is, the body of the adult divides and becomes two distinct individuals, others by *budding*, or the production of a minute particle of protoplasm, which in time separates itself from the parent mass and develops an independent existence; or by *spores* or *germs*, which are cast off by the parent body and live for a time an existence altogether unlike that of the true protozoan. In this spore form they are able to withstand drought and cold, and may be blown about freely from place to place.

PROUDHON, *proo doh'N*, PIERRE JOSEPH (1809-1865), a French socialist and political writer. In 1840 he published a famous work, *What is Property?*, summing up in it his celebrated dictum, "Property is theft." For this treatise and for two others that followed, he was prosecuted at Besançon, but was ultimately acquitted. From 1844 to 1847 he managed a system of water transport on the Rhône and Saône rivers. He settled in Paris in 1847, edited various socialistic newspapers, became a leader in the Revolution of 1848 and was elected a representative for the Seine in the Constituent Assembly. His attempt to found a People's Bank was unsuccessful. For his outspokenness in the press he was imprisoned for three years; on regaining his liberty he went to Belgium, but spent his last years in France.

PROVENÇAL, *pro vahn sal'*, **LANGUAGE AND LITERATURE.** The Provençal language may be designated as the chief of the literary dialects which flourished in the Middle Ages in France. The name comes from Provence, the province in which it was spoken. Provençal was the earliest of the Romance languages (those based on Latin) to develop, appearing as a new and distinct language early in the tenth century. It produced an extensive literature and continued to be used as a medium of literary expression until the early part of the thirteenth century.

PROVERBS, one of the canonical books of the Old Testament, usually ascribed to Solomon, containing a collection of short

poems, epigrams and proverbs known as the "Wisdom Literature." According to modern Biblical scholars, the book of *Proverbs* is composed of several sections, written by various authors and at different times, ultimately collected into a single book at some period subsequent to the return from the Captivity.

PROVIDENCE, R I, capital of the state and one of the oldest cities in the United States. It is the county seat of Providence County, the metropolis of Rhode Island and the second largest city in New England, ranking next to Boston. Among American municipalities Providence is thirty-seventh in rank, according to the Federal census for 1930. Providence has a favorable situation at the head of a tidal arm of Narragansett Bay, known as Providence River. It is thirty-five miles north of the open sea, forty-four miles southwest of Boston and 190 miles northeast of New York. It enjoys steamer connection with the chief Atlantic ports of the United States, and has adequate railroad facilities, being served by the New York, New Haven & Hartford Railroad and numerous electric lines. There are three airports.

General Description. Like ancient Rome, the city is built on seven hills, the highest elevation attaining an altitude of 200 feet. This ridge, which is the dividing line between the Seekonk and Providence river valleys, is the site of the campus of Brown University. Because of the peculiarity of its site, the outline of the city is very irregular. The sides and summits of the hills are covered with beautiful dwellings, some of them dating from colonial times, while the business part of the city is on the lower land along the river and bay. In the older part of the city the streets, like those of Boston, are narrow and crooked. There are over forty public parks, whose combined area is 650 acres. The most important of these is Roger Williams Park, on the south side. This contains a statue of Roger Williams and has a fine system of boulevards, besides gardens and lakes. In front of the city hall is a soldiers' and sailors' monument, and near it is a statue of Gen. Ambrose E. Burnside.

The educational institutions include Brown University (which see), the Friends' School, the Rhode Island College of Education, Providence College, and the Rhode Island School of Design. The leading charitable and philanthropic institutions are the Butler Hospital

for the Insane, the Rhode Island Hospital, Rhode Island Homeopathic Hospital, Saint Joseph's Hospital, the Dexter Asylum for the Poor and the state institution for the deaf. The Rhode Island Historical Society occupies a fine building of brick and granite and has a valuable library. In addition to this are the Providence Public Library, the Athenaeum Library, and the John Hay and John Carter Brown libraries of Brown University.

Commerce and Manufacture. Providence is one of the most important industrial centers of New England. Chief among its manufacturing enterprises are those devoted to the manufacture of jewelry and allied products. Closely associated with the jewelry industries is the manufacture of silverware. In both of these industries Providence ranks among the leading cities of the United States. It is also the leading city in the manufacture of files and screws, and other manufactures include worsteds, woolen goods, cotton goods, rubber goods, machine tools, machinery and stoves. Dyeing and bleaching are also of considerable importance. The city and the state, with the aid of the Federal Government, have had the harbor deepened and a straight thirty-foot channel dredged to deep water. The city built a quay 3,000 feet long in thirty feet of water at mean low tide, equipped with complete freight handling apparatus and railroad connections. Foreign trade is being encouraged in every way, and is rapidly developing.

History. Providence was settled in 1636 by Roger Williams, and is noted as the first settlement in New England in which religious freedom was guaranteed the inhabitants. Williams named the place Providence in recognition of his providential escape from the perils of the wilderness on his journey from Salem, Mass. It was also here that the first Baptist church in America was founded. The settlement grew slowly, and at the end of the first century of its existence, it numbered scarcely 4,000 inhabitants. In 1676, during King Philip's War, the Indians attacked the town, burning over one-third of its houses. In 1815 part of the town was flooded during a great storm. After this, however, the place prospered, and was incorporated as a city in 1832. Population, 1920, 237,595; in 1930, 252,981, a gain of 6.5 per cent.

PROVINCE, *prov'ins*, a geographical division of the Dominion of Canada similar in character and powers to a state of the United

Outline on the Province

- I. LOCATION
 - (a) Latitude
 - (b) Longitude
 - (c) Boundaries
 - (b) Navigable rivers
 - (c) Commercial centers
 - (1) Ten largest cities, in order
 - (2) Population of each
 - (3) Distances from other cities
- II. EXTENT
 - (a) Length
 - (b) Breadth
 - (c) Area
 - (d) Compare with other provinces
- III. OUTLINE
 - (a) General form
 - (b) Boundaries
 - (c) If there is coast line
 - (1) Length
 - (2) Indentations
 - (3) Projections
- IV. SURFACE
 - (a) General facts
 - (1) Mountains or great hills
 - (2) Plains
 - (3) Valleys
 - (4) Watersheds
 - (b) Effects on climate
- V. DRAINAGE
 - (a) River systems
 - (b) Lakes
 - (c) Springs
- VI. CLIMATE
 - (a) Natural conditions expected
 - (b) How changes are wrought by physical features
 - (c) Effect on health
 - (d) Compared with other provinces or countries in same latitude
 - (e) Average annual rainfall
- VII. PRODUCTS
 - (a) Agricultural
 - (1) Grains
 - (2) Stock raising
 - (3) Dairying
 - (4) Fruits, etc.
 - (5) Rank among provinces
 - (b) Mineral
 - (1) Precious metals
 - (2) Iron, coal, copper, zinc
 - (3) Oil and gas
 - (4) Rank among provinces
- VIII. COMMERCE AND INDUSTRY
 - (a) Railways and canals
- IX. POPULATION
 - (a) Rate of increase
 - (b) Per cent of native Canadians
 - (c) Countries furnishing foreign-born proportion
 - (d) Where densest, and why
- X. GOVERNMENT
 - (a) Provincial departments
 - (1) Executive
 - (2) Legislative
 - (3) Judicial
 - (4) How officers are chosen
 - (5) Length of terms
 - (6) Duties
 - (b) Number of counties
 - (c) Number of members in Parliament
 - (d) State institutions
 - (1) Penal
 - (2) Charitable
 - (3) Education of defectives
- XI. EDUCATION
 - (a) Public school system
 - (1) Common schools
 - (2) High schools
 - (3) Normal schools
 - (4) Industrial education
 - (5) Provincial University
 - (b) Colleges
 - (c) Private and separate schools
- XII. HISTORY
 - (a) Exploration
 - (b) First settlements
 - (c) Date made a territory
 - (d) When admitted to Dominion
 - (e) Events that are historical
 - (f) Famous men and women
- XIII. STATISTICAL
 - (a) Rank among provinces in mineral products
 - (b) Rank in farm products
 - (c) Rank in area
 - (d) Rank in population

States. The provincial government is modeled very closely after the general character of the Dominion government. The constitution of the province is practically the constitution of the Dominion, for the latter expressly dictates what matters may be dealt with by the provincial governments. Within these limits it is free to act as it pleases. The provincial government, like that of the Dominion, has three great departments, the executive, the legislative and the judicial. See **OUTLINE**, herewith.

Related Articles. The various departments relating to a province are described under the following titles in these volumes
Executive Council Lieutenant-Governor
Legislative Assembly Provincial Courts

PROVINCIAL COURTS, IN CANADA.

As the British North America Act gives to the provinces exclusive control over all matters affecting property and civil rights, the provincial courts have to deal with subjects that affect intimately all classes of persons. On the other hand, the Dominion Parliament alone makes laws relating to crime and criminals, but the trial of offenders must take place in the courts of the province, which have the right to administer justice. In other words, the provincial courts have absolute powers in all civil and criminal actions at law, but the Dominion Government determines the course of procedure in criminal cases. This division was due to the fact that in the province of Quebec the code of French civil law prevailed, whereas in the other provinces the civil law was based on English procedure. The criminal law of England has prevailed in all the provinces since 1763, but the civil code has always been different. This difference made it necessary to allow the provinces complete control of civil law.

The provincial courts are of various kinds and differ in each province. It is impossible to give a complete list of all the courts, but a short summary of the classes into which they may be divided will be of value, as showing the principles on which all the systems are based:

1 Inferior courts of civil jurisdiction, for the recovery of debts and the settlement of civil actions where small sums of money are at issue

2 Inferior courts of criminal jurisdiction, for petty offences and for preliminary examination in cases of serious crime

3 Superior courts, for the trial of civil and criminal cases before a judge and jury in each judicial district.

4 Special courts for the dissolution of mar-

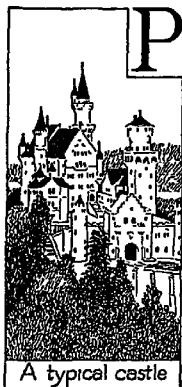
riage, proving of wills, trial of disputed elections, etc.

5 Supreme Court, a court of appeal, for each province

PROVO CITY, UTAH, the county seat of Utah County, forty-five miles south of Salt Lake City, on the Provo River and on the Denver & Rio Grande Western and the Union Pacific railroads. There is a municipal airport. The city is in a farming, stock-raising and fruit-growing region, and it has canneries, flour and lumber mills and manufacturing of pig iron, castiron pipe, and sugar mills. Provo Cañon, Utah Lake and Bridal Veil Falls are of considerable scenic interest. The Brigham Young University is located here, and the city also has a state asylum for the insane, a Mormon tabernacle, a Federal hospital, and the state fish hatchery. The place was settled in 1849, and incorporated in 1851. The commission form of government is in operation. Population, 1920, 10,303, in 1930, 14,766, a gain of 43 per cent.

PRUNE, a dried or preserved plum. One of the best prune plums is grown in the valley of the Loire, in France, long the chief prune-producing country of the world. Other European centers of the prune industry are Germany, Austria, Spain, Portugal and certain Balkan districts. South America is also an important producer. Prune culture started in California in the middle of the last century, and to-day that state, Washington and Oregon produce more prunes than all other prune-producing districts combined. Food purveyors declare that the consumption of prunes is on the increase, both in the United States and in Canada.

PRUNING, the cutting portions of a plant, as stem, branches, shoots or roots, for the purpose of checking growth in one direction and assisting it in another. While the immediate effect is to reduce the growth of the plant, it ultimately tends to produce a larger and stronger plant. Plants are pruned for various purposes. The gardener prunes to change the form of his plant, or to increase the size and brilliancy of the flowers; the nurseryman prunes to aid the plant in perfecting its fruit. Pruning should be done when the plant is in full vigor, as the wounds then heal quickly. Branches should be cut close to the part from which they are taken, and if they are large, the wound should be covered with paint or wax, to protect it from the weather.



A typical castle

PRUSSIA, *prush'a*, from 1871 until 1918 a kingdom of the German Empire, the largest, wealthiest and most important of the German states. Its king, an hereditary monarch of the Hohenzollern family, was emperor of Germany, and Berlin, its capital city, was also the seat of government for the whole empire. In Prussia the German military spirit had its most vigorous expression, and throughout the World

War the Prussian kingdom was the dominating section of the empire.

With an area of 134,616 square miles before the war, Prussia covered three-fourths of the empire, almost encircling the grand duchies of Mecklenburg and Oldenburg, the duchies of Anhalt and Brunswick, the Lippe and Waldeck principalities, and the free cities of Hamburg, Bremen and Lubeck. It comprised fourteen provinces. After the war, while Prussia remained the largest division of Germany, its importance decreased, as will be seen from the territorial seizures described below.

By the terms of the Treaty of Versailles (1919), Prussia was to be deprived of over 30,000 square miles of its original territory. To Poland were ceded outright Posen and the province of West Prussia on the left bank of the Vistula River. Because of the protests of the Germans the allies consented to a plebiscite in Silesia to determine what portion of that province should be ceded to Poland. The Prussian city of Danzig, on the Baltic Sea, was made a free port under guarantee of the league of nations. East Prussia was isolated from the rest of Germany, and the southeastern third of that province was to have its nationality determined by vote of the people. Other boundaries between East Prussia and Poland were also to be determined in like manner. In addition, the Danish part of Schleswig, belonging to the province of Schleswig-Holstein, reverted to Denmark.

Reduced to 113,012 square miles of territory by the cessions imposed, Prussia was yet the most powerful member of the German republic that was founded in 1919 on the ruins of the empire, and it continued to exert

a profound influence on the government. However, in 1934 the Nazi government of Germany, which had overthrown the republic, obliterated state lines and proclaimed a centralized control of the whole country as a single state. Population, 1933, 39,934,011.

History. The historical development of the Prussian kingdom is closely associated with two important elements. The first of these is found in the growth in power of the electorate of Brandenburg, which formed the nucleus of the future kingdom of Prussia. The second is associated with the rule of the Hohenzollern family, under whose skillful guidance the small electorate of Brandenburg grew into an important kingdom.

The Prussians were a Slavonic people, inhabiting the coast territory between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end conquered the whole country, with the aid of the Teutonic Knights (1283). As the price of their assistance, the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia was held by the Teutonic Knights as a fief of Poland. A member of the Hohenzollern family came to power in East Prussia in 1511, and he succeeded in having the state declared a duchy, with himself as hereditary ruler. When the line of his descendants failed, in 1618, the duchy of Prussia was added to Brandenburg, which was ruled by a member of another branch of the Hohenzollern family, John Sigismund.

John Sigismund was succeeded in 1619 by his son, George William, who proved unequal to the crisis of affairs in Germany, brought about by the Thirty Years' War. The electorate suffered severely in this struggle, and when Frederick William I, called the Great Elector, came to the throne in 1640, he found his territory occupied by a Swedish force. Frederick William may be regarded as the virtual founder of the Prussian monarchy. He made Brandenburg a military state and won for it recognition from the powers of Europe. The Great Elector, on his death in 1688, was succeeded by his son Frederick, who in 1701 was crowned first king of Prussia. He was succeeded by his son, Frederick William I, whose reign, which lasted until

1740, was on the whole peaceful. A war with Sweden, however, won for the new kingdom a great part of Swedish Pomerania.

Frederick II, called the Great, came to the throne on the death of his father in 1740. In less than a year after his accession he proclaimed war against Maria Theresa, in order to enforce his claim to Silesia. With varying fortunes the struggle continued until the Peace of Hubertsburg, 1763, which closed the Seven Years' War. The outcome of this war transformed Prussia into one of the first-rate European powers, and the first partition of Poland, which took place in 1772, greatly enlarged the country by the addition of West Prussia.

The successor of Frederick II, his nephew, Frederick William II (1786-1797), interfered in the affairs of France on behalf of Louis XVI, and in consequence he was forced to give up the territory which Prussia had possessed west of the Rhine. A second and a third partition of Poland brought to Prussia considerable accession of territory. Frederick William III, who succeeded to the throne in 1797, attempted at first to remain neutral in the general European struggle against Napoleon. This attitude, however, ultimately led to distrust among the German states, and the formation by the other states of the Confederation of the Rhine left Prussia at the mercy of Napoleon. When in 1806 Frederick William found himself driven into the struggle against France, the result was complete defeat at Jena and Auerstadt. By the peace of Tilsit (1807), the country was deprived of all lands between the Rhine and the Elbe.

The years which followed were marked in Prussia by sweeping internal reforms, which the crisis necessitated and which were efficiently carried out under Stein, Hardenberg and Scharnhorst. Owing to these reforms, which amounted almost to a revolution, Prussia was able, after Napoleon's disastrous Russian campaign of 1812, to take an important part in the final struggle for his overthrow. At the Congress of Vienna in 1815 Prussia was deprived of some of her possessions, but was recompensed with others which were of more value to her. She also formed one of the states of the German Confederation.

After the restoration of peace, Frederick William III was guided by the councils of Metternich and the Holy Alliance, and he entered upon a reactionary policy, which con-

tinued until his death in 1840. Frederick William IV, who succeeded him, tried in 1847 to anticipate the revolutionary movement, which he saw to be imminent, by summoning a general legislative assembly. No real power, however, was conferred on this parliament, and in the following year the king was forced to dismiss his ministers and grant a constitution. In 1849 the imperial crown was offered to Frederick William, but he refused it, and thus he lost the opportunity of placing himself at the head of a united Germany. For the further history of Prussia, the union of the German states under its leadership, and the effects of the war, see page 2956 and GERMANY, subhead *History*.

Related Articles: Other phases of the history of Prussia will be found under the following headings:

Bismarck-Schönhausen	Frederick William III
Brandenburg	Frederick William IV
Danzig	Hohenzollern
Franco-German War	Schleswig-Holstein
Frederick I	Seven Weeks' War
Frederick II	Seven Years' War
Frederick III	Succession Wars
Frederick William	William II

PRUSSIC ACID, or HYDROCYANIC ACID, an acid discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F. to feathery crystals, and which boils at 80°. It dissolves in all proportions in water, forming a liquid which reddens litmus paper but slightly. In nature it occurs in the kernels of bitter almonds, peaches, apricots, plums, cherries and quinces; in the blossoms of peaches and aloes; in the leaves of beech, cherry and laurel, and in various parts of other plants. Pure prussic acid is artificially obtained by passing a stream of dry sulphureted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution.

PSALMS, *psalmz*, BOOK OF, one of the books of the Old Testament, containing the religious poetry of the Hebrews. The collection consists of 150 compositions, divided in the Hebrew Bible, like the Pentateuch, into five books. The Psalms are perfect lyric outpourings of the finest human emotions, and each, with a few exceptions, has a particular superscription, such as *Maschil*, instruction, or *Michtam*, memorial.

The chronology of the Psalms is much disputed. The earliest are credited to Moses, many are attributed to David, a few are sup-

posed to have been written on the return from the captivity, and some in the time of the Maccabees. The twenty-third Psalm, beginning "The Lord is my shepherd, I shall not want," the most familiar of all the Psalms, was written by David, and is reminiscent of his early life among the sheepfolds.

PSEUDONYM, *su'doh nim*, a word derived from the Greek, and meaning a *false name*, is the term usually applied to the pen name of authors, as the name *Lewis Carroll*, used by the author of *Alice in Wonderland*, his real name being Charles Dodgson; *Uncle Remus*, the name which Joel Chandler Harris attached to many of his tales, is also another familiar pseudonym. *Nom de plume*, the French for *pen name*, is frequently used by the English, but it is not employed by the French.

PSYCHE, *si'ke*, in classical mythology, an exquisitely beautiful maiden. Her beauty aroused the jealousy of Venus, and that goddess instructed her son Cupid to kill Psyche, or to cause her to fall in love with some ugly wretch. Cupid went to do his mother's bidding, but himself fell in love with Psyche, and coming to her in darkness told her of his love and claimed her as his wife. He demanded of her a promise that she would never seek to see his face, and after that came nightly to be with her. Psyche, aroused to suspicion by her jealous sisters, one night lighted a lamp and held it over Cupid while he slept. The god's beauty gave her a start, and she spilled a drop of hot oil upon his shoulder. Cupid arose, reproaching her for breaking her promise and left her; and Psyche, forlorn, wandered far and wide in search of him.

Venus imposed many cruel tasks upon her, and Psyche tried to perform them all, hoping thereby to gain the goddess' help in her quest. At last, weary and in despair, she sank down by a roadside and fell asleep. Cupid, passing by, saw her, and, overwhelmed by his love for her, took her to Olympus and pleaded with the gods to make her immortal. Psyche's appealing beauty touched even Venus, and the lovers were reunited. Psyche is believed to symbolize the heart, Cupid the soul; and the trials the unhappy mortal was forced to undergo are but the struggles the human heart must experience before it attains perfection.

PSYCHOLOGY, *si ko'lo jy*. Modern psychology is the science of human nature as it

shows itself in thoughts and actions. The word psychology originally meant the science of the mind, and in other countries psychologists still think of it as that—but our definition is quite common in America.

People have always been interested in human nature, and have tried to find out what makes it different from all other kinds of nature. In the old days philosophers sat around and made up theories about it, but with the advent of the scientific age in which we live, psychologists adopted other ways of studying—by carefully observing and experimenting with each other and with babies, and cats, and imbeciles, and gold fish, and professors, and monkeys. How soon after birth can a baby taste anything? How quickly can a cat learn how to get out of a certain cage? What can an imbecile learn to read? What does a goldfish do in the dark? Is a male monkey more fond of his food than he is of a female monkey? What qualities are necessary in order to be a good professor? These and a thousand other questions about abilities and behavior have engaged the psychologist.

Learning. It is only by trial, by experiment, that we learn anything; and learning is the one thing that we all do all our lives. So in the study of psychology, a good starting point is to study how people learn. All of us are born with certain capacities to learn. Some of these capacities are purely physiological and develop at their own rate, in their own way. This is true, for example, of the sense of taste. A little baby at first cannot tell a piece of sugar from a piece of bitter alum; at least he shows no difference in facial expression. But gradually he shows liking for one and disliking for the other. As the sensitivity of his tongue develops he learns to distinguish between different kinds of taste. When we study taste in grown persons we find that the front part of the tongue tastes sweet things, the back of the tongue bitter things, the edges of the tongue salty things, and so on. Here we see a type of learning which depends mainly upon the gradual and natural development of the special senses.

The sense of vision, the ability to see, develops in a somewhat similar way. At first only light and dark can be distinguished, then the reds and greens, then the yellows and the blues. A tiny baby does not show any signs of seeing when a colored ball on

a string is swung in front of him. Then gradually he begins to follow the ball with his eyes, and with his head. Later he will reach for the ball, but his arm may go in the wrong direction, and he tries to grasp it when it is still too far away. A good many mistakes are made, but gradually he learns directions and distances, coordinating hand movements with eye movements.

Psychologists have spent much time studying such learning of infants, measuring the length of time it takes, and the number and kinds of mistakes made. They have compared the rate of speed at which infants learn with the progress of adults who are set to solve complicated puzzles. These records of performance have also been compared with the records of cats learning how to get out of cages, and of rats learning to run through complicated mazes. Even the ability of the lowly earthworm to learn to turn to the right has been studied in the laboratory. These records all have the same general form if the problems are equally difficult for the individuals tested. Thinking, analyzing, reasoning, do not help an adult if the problem is beyond his intelligence. He then has to learn in the same hit and miss fashion as an animal. His intelligence helps him, of course, with the simpler problems which may be away over the heads of animals and babies.

Laws of Learning. There are many interesting theories as to the exact way in which the learning process takes place, how, for instance, a cat getting out of a cage learns gradually after many attempts and many mistakes, to put its paw on the proper catch right away and just walk out. Although none of these theories are as yet entirely satisfactory as full explanations of learning, a great deal is known of the underlying principles. You are illustrating some of these principles while reading. For instance, you are interested in psychology, so you are devoting your attention to this page. You may not be interested in pterodactyls and so even if you were to read the article on them you would not remember much about it. In order to learn, there must be interest and attention. Distracting sounds and sights may be taking away some of your attention; if so, you will know less when you have finished your reading. If you want to remember what this is all about you should read it straight through, perhaps

more than once, instead of reading the first sentence until you have learnt it, and then the second sentence, and so on. Going over the material more than once, possibly testing yourself or getting someone else to ask you questions, will fix it in your mind better still, for you will then have to concentrate your attention on it. If you do not look at a book on psychology or do not think about the subject for a long time, you will forget more and more of what you have learnt, though you can never lose it all. But if periodically you think about it, or talk about it with someone, it will become much more fixed in your mind.

Such findings and principles in regard to learning, apply to almost all forms of learning, whether by memorizing or by what might be called muscle-memory, as when you learn to skate or to drive an automobile.

But not every one can learn to do every thing, even if he follows all the rules that have been worked out. There are differences between individuals in their capacity to learn. The study of capacities and abilities is one of the most important fields of modern psychology.

Individual Differences. Ever since the world began, people have noticed the differences between individuals, how one man was a mighty hunter, another was clever at making bows and arrows, and so on. Today with the very wide diversity of occupations and skills, these differences are even more apparent. They are also more important. A boy may want above everything to become a doctor. To do so he and his parents will have to spend a great deal of time and money on a school and college education; but if he does not have the abilities necessary to become a doctor, all this money and many years of his life will be wasted, for at the end he will fail to qualify.

Psychologists in their studies of learning saw that some people are able to learn almost anything easily and to retain it, that others are of the opposite sort, learning most things with difficulty and forgetting them quickly, while most of us are somewhere between these extremes. There are some persons who apparently cannot learn certain things at all, but who can learn other things quickly and well. So laboratories have been set up in order to separate out these different abilities and capacities, and to see how accurately they can be measured.

Intelligence. It has been found that underlying or combining with almost all abilities is one ability called intelligence. A person's intelligence is usually estimated by comparing him with others as to his ability to solve all sorts of problems,—his quickness in learning new things. People vary all the way from clever to dull. The clever ones are able to learn much more than the dull ones, although there are many things that the less intelligent people can learn to do. Standard tests have been developed which give an approximate estimate of a person's intelligence or brightness. One thing to remember about these tests is that most of them only rate intelligence, they do not really measure it. That is to say, when a man is tested and found to have *B* intelligence, it means that he is brighter than most people, but not so bright as those who score *A*.

Examples of these tests are:

Binet-Simon Tests (Stanford Revision)
Institute of Educational Research Examinations (Thorndike)
Revised Alpha Examinations (Wells)
Bureau Test VI—Mental Alertness A spiral omnibus test based on Army Alpha.
Army Beta Performance Test
National Intelligence Tests
Terman Group Test of Mental Ability
Otis Self-Administering Tests of Mental Ability
O'Rourke General Classification Test

While these tests are only approximate, they are fairly reliable in the sense that if a man is tested now and again later on, he will generally be found to make about the same score, unless in the meantime he has suffered some illness of the brain.

All tests, even when they are supposed to be measures of capacity to learn, are really tests of abilities. Thus if we wish to test a boy's mechanical aptitude we give him a standard set of locks, valves, cogwheels, and other parts, to see how quickly and well he will put them together. We assume that during their lives the boys we are testing have learnt in some way or another how to do such things. If they have learnt well we say they have good mechanical ability, but if they do poorly in the test we say they have little of this ability. Of course, you may object that one boy has had more chances to learn, one boy is interested in mechanical things, one boy has a father who is an engineer, and so on. Just so. Our test is really to find out what the net result of

all those influences has been. There is no reason why a boy who is poor in mechanical ability cannot learn to develop it, provided he is intelligent enough; but it has been found that as a matter of fact he very seldom does so. When this ability is measured again after five years, the changes in rank are not often very great. Though this and other abilities may not be definitely fixed at birth, after a certain age in life they generally do stay about the same.

Psychologists are not content with such findings but are studying to improve their tests, in order to find out how much inheritance counts, and how changes in abilities do take place. Also they are experimenting to find out how far interest affects ability, how far developing one ability helps in developing another, and so on.

Special Capacities. To what extent abilities or capacities are inherited, and to what extent they are the product of early experiences is not known; there is probably some of both. Most people seem to be able to learn to do most things at least moderately well. But most people also have some special capacity which they should discover and develop so that they become experts in that line. Many have never discovered where their strength lies, and go through life doing only moderately well. Some choose to develop abilities which they do not have at all, and so become failures. Some try many different things before they find their specialty. All of us should do our best to discover our strong points, and then we should plan our schooling and our work in ways which will permit us to capitalize on our special abilities.

The following is a list of tests often used to discover capacities and abilities:

O'Rourke Mechanical Aptitude Test
Minnesota Tests of Mechanical Abilities
Detroit Manual Ability Test
Clerical Test K (Benge)
Minnesota Vocational Test for Clerical Workers (Andrew)
Examination in Clerical Work (Thurstone)
Clerical Aptitude Test, Junior Grade (O'Rourke)
Measures of Musical Talent (Seashore)
Art Test (McAdory)
Abilities of Visual Art
Art Judgment Test (Meier-Seashore)
Stanford Scientific Aptitude Test (Zyve)
Ability to Sell (Moss)
Aptitude for Nursing (Moss and Hunt)
Honesty in School Work (Moller)
Personality Inventory (Bernreuter)

Ascendancy-Submission Reaction Study (Allport)

Emotional Maturity

Social Attitudes Scales (Thurstone)

Vocational Interest Analysis (Strong)

Occupational Interest Blank for Women (Mannson)

There is however another vast field of psychology. A person may have abilities and yet not use them, may have learnt well and yet not be able to use what he has learnt. His life is not made up of intellect and skill only—perhaps of them least of all. It consists even more of emotion, feeling and will; for the drives to action which our feelings and desires supply, form the bases of our personalities and characters.

Personality. One's personality depends partly on the kind of physique he has, whether he is fat or thin, tall or short, good looking or plain; and also on the way his hormones—the bio-chemical substances in his blood that regulate the activities of his inner bodily processes—are balanced. But even more, his personality is a product of his early experiences—the kind of home, parents and nurses he had, and the accidents of early childhood. These experiences react upon his physical makeup, and on the few instincts with which everyone is born. The three basic instincts may for lack of better terms be called affection, pugnacity, and fear.

Instincts. If some sensitive part of a baby is stroked or caressed, he smiles and coos. This instinctive behavior is the basis of emotional love, of father, mother, or furry cat. Developing through life it becomes complicated in all sorts of ways, in relation to people and to ideals.

If the arms of a baby are hampered or restrained, either by clothes, or by being held against his will, he struggles and yells and becomes angry, and in his own little way tries to fight. From such small beginnings the instinct of pugnacity develops into the emotion of anger.

The emotion of fear is at first only the shrinking response that a baby makes when he is let drop, or when he hears a sudden noise. Soon, however, this primitive response becomes attached to other situations; and by the time he has reached manhood, he may have acquired a wide assortment of unnecessary fears and terrors. To understand how each of these fears first arose, is often a good way to get rid of them.

The kind of person one becomes depends then largely on the way he is treated as a child. According to most psychologists the early beginnings of his training are never lost, but are built on and developed, and last throughout life without great changes.

Pleasure or fear or rage or any other emotion is always accompanied by bodily changes. If a cat is lying idly by the fire after a meal and a strange dog comes in and barks at it, immediately the cat's fur rises and also her stomach contracts and digestion stops till she calms down again. So with us, quickening of the pulse, blushing, trembling, perspiring, the warm feeling around the heart, the catch in the throat, the paralyzing of digestion, and other bodily changes accompany various emotions. Such close relations between the body and the "mind" are noticeable in the effects of alcohol, of drugs, of loss of sleep, of hunger, and of fatigue, all of which affect the extent to which we become emotionally aroused.

So our fear and shyness, our oversensitiveness, anger, jealousy, affection, sentiment, ambition, start and develop by the way the people who influence our lives treat us—our parents, brothers and sisters, teachers, preachers, and companions. These traits of personality are formed so early in our lives that we have often no memory of the first incident that caused us to be afraid of big dogs, to hate cruel people, to be kind to the unfortunate, etc. The people around us, when we are young, do not all treat us the same way; in fact the same person is subject to moods and changes in emotion, and treats us differently at different times. So our emotional reactions become tangled and mixed. They conflict with one another. The really timid person, instead of behaving timidly, assumes an attitude of extreme pugnacity; the kind person who is imposed upon varies between kindness and cruelty; and so on. Some people have a great deal of trouble with these internal conflicts of emotions, which interfere with learning and with work. They cause a person to be changeable and undependable; they may lead to loss of self-confidence. The person who is most liked and admired is one with a well-balanced emotional life,—a so-called integrated personality in which these conflicts are few.

Character and Will.—One's character is very largely built upon this emotional basis.

It consists of our habit patterns and of our dominant purposes or ideals. Psychologists used to try to find out about the "will," what it is and how it worked. They spend less time on it now, for it is generally thought that the strong will or the weak will has a deeper origin. This does not mean that the will as we commonly understand it cannot be trained and developed by suitable means. When we are young we see around us our parents and others, all doing this, that and the other. So we grow up taking it for granted that we will do such things. There are very rare cases in mental institutions of people who though quite well physically cannot bring themselves to do anything at all. They have so many conflicts going on inside them that all their energy is used up fighting themselves. But normal people always want to be doing something. Philosophers have said that we have an inner urge, a life force, or something, which makes us want to do things. It may be that we have; or it may be that we are trained from earliest childhood to be active. In either case, this constant drive to be doing something furnishes the matrix out of which character is formed.

A boy's father is a big, strong man who works as a foreman in the factory. If he is kind, the boy may want to be the same as his father, to do the same things and lead the same sort of life. He gets the companionship of the father he loves. Or his father may be cruel to him, order him about, or treat his mother unkindly, so that the boy learns to hate his father. Then he may do one of two things. He may say to himself, I will go into the same occupation, but I will study hard and no matter what sacrifices I make, I will become a boss in that factory, so that I can show my father and mother and others that I am better than my father, that I can order him around, or make him show respect for me. Or he may say, I will try some other occupation in life where I do not ever have to think of my father and the things he used to do.

Of course the boy does not sit down and consciously make up his mind in just that way. But actually he does gradually come around to choose his life's work and his companions, partly as a result of parental relationships of this kind. His relationships to his mother, brothers, sisters, and teachers have their effects also, with the result that

there is often opportunity for doubt about the proper occupation to choose, with no clear choice, or a change from one plan to another.

So the amount of determination and will power that a person has depends largely upon these emotional motives that develop in early childhood. A loving mother who criticizes the father as a weak willed man and tells her boy to be different, the acid tongue of an elder sister, the jeers of school-mates, and so on, determine the boy's will. England is said to be governed by Scotsmen. The people in the highlands live hardy lives in a hard climate; they despise softness which sacrifices the future for present ease; they resent the inferior position of Scotland whose Kings once ruled England. So their sons without money go to the universities and colleges or to the factories and banks, and eschewing pleasure, with great will and determination go down and dominate the English.

This is the modern theory of will and character and of the way in which they develop out of emotional contacts and relationships. Character finally tends to become set and fixed and almost unchangeable. Under stress of great difficulty a character may break down; but if it does, the theory is that some weakness was there from the beginning.

So modern psychology is a practical science, looking all the time at the problems of human nature as revealed in thoughts and actions. In studying these thoughts and actions psychology has developed its own scientific methods. Just as the engineer who wants to analyze a piece of steel takes it off to his laboratory and subjects it to tests in pulling it, crushing it, twisting it, heating it, and so on, so the psychologist in studying a human being takes him to a laboratory where the external distractions can be controlled, and there tests his sensitivities, his intelligence, his abilities, his strength of purpose. He observes his behavior under standard conditions to see how social he is, how well balanced he is emotionally. And as the engineer also studies the behavior of the steel when it is in the bridge, subjected to unforeseen strains of flood and fire, so that he may know how well his laboratory tests predicted what would happen, so also the psychologist studies the behavior of individuals in the working world and improves his tests accordingly. In factories and stores, in schools, in court, wherever adjustments

of people and their activities have to be made, he applies what he has discovered to the problems of human relationships.

The following books are suggested for further reading. These books and the tests listed above may be obtained by inquiry to the Psychological Corporation, 522 Fifth Avenue, New York City. This is a non-profit-making association of the leading psychologists in America, organized to assist those interested in Psychology:

Intelligence Testing, by Rudolph Pintner. A discussion of what is meant by intelligence testing, what means are employed to test general intelligence, and what results have been achieved.

The Measurement of Intelligence, by Lewis M. Terman. For use with the Stanford Revision of the Binet-Simon Scale.

Mental Measurement of Preschool Children, by Rachel Stutsman. A standard guide on testing young children for use by psychological examiners and for the training of students.

Aptitude Testing, by Clark L. Hull. Suitable as a handbook for all engaged in aptitude testing for vocational guidance or employment selection.

Procedures in Employment Psychology, by W. V. Bingham and Max Freyd. An outline of a procedure for developing, evaluating, and installing measurement methods in vocational selection.

Psychological Service for School Problems, by Gertrude H. Hildreth. A practical description and interpretation of the functions of the school psychologist. Organized to give school administrators, as well as the psychologist, a guide for the most effective application of psychological service.

Diagnosing Personality and Conduct, by Percival M. Symonds. A summary of the research that has been done and the various methods used, in the measurement of personality and conduct.

The Measurement of Interests, by Douglas Fryer. A survey and evaluation of modern interesting testing.

How to Develop Your Personality, by S. M. Shellow.

W. V. B.

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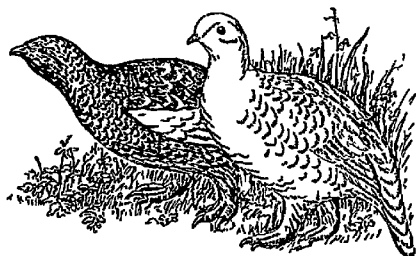
Apperception	Feeling	Memory
Association of Free Will	Mind	
Ideas	Habit	Pedagogy
Attention	Hallucination	Perception
Brain	Imagination	Reason
Child Study	Instinct	Senses, Special
Concept	Interest	Thought
Dreams	Judgment	Will

PSYCHOLOGISTS

Dewey, John	Helmholtz, Hermann
Galton, Francis	James, William
Gail, G. Stanley	

PTARMIGAN, *tahr'mi gan*, a bird of the grouse family, distinguished from the true

grouse by its feathered toes and noiseless flight. In winter the plumage of most species becomes white, and even in summer much of it remains so. The ptarmigans live in cold



PTARMIGANS

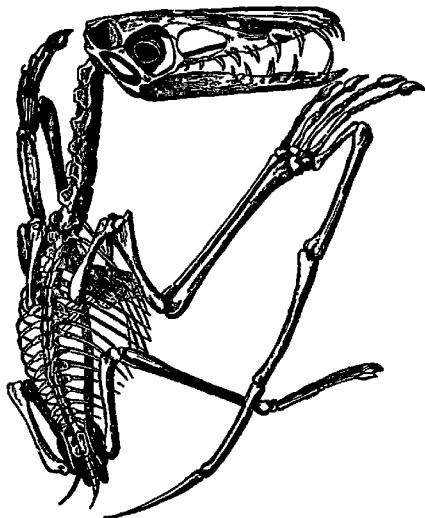
Summer and winter plumage

regions of the northern hemisphere, and find their living among the lichens, mosses and stunted plants that grow on the rocks and in the snow. They nest on the ground and lay from six to eleven eggs, ranging in tint from cream to reddish-buff and marked with brown or black splotches.

PTERIDOPHYTES, *ter'i do fites*, the fern plants, one of the four great divisions of the vegetable kingdom. They are next in rank to the flowering plants, which they resemble in many respects. The group embraces ferns, horsetails, clubmosses and many forms that are now extinct. The ferns are the most numerous, there being about 4,500 species (see **FERNS**). Of the horsetails there are only about twenty-five species. They have jointed, branching stems, which give the plant a conical contour, and no foliage. The clubmosses, of which there are about 500 forms, have trailing stems thickly covered with tiny foliage leaves.

PTERODACTYL, *ter o dah'til*, extinct flying lizards, remains of which are found in the Jura limestone formations, in some sections of Europe. The pterodactyl had a moderately long neck and a large head. The jaws of the earlier genera were armed with equal and pointed teeth; later animals lost their teeth, but developed very long jaws. The skeleton was light, and most of the bones were hollow and filled with air; but the chief characteristic consisted in the excessive elongation of the outer toe of the fore foot, which served to support a flying membrane, forming a wing somewhat resembling the wing of a bat. A number of species have been discovered, the size ranging from twelve

inches to twenty feet. Some of the animals were powerful flyers, while others could only



SKELETON OF PTERODACTYL

volplane downward from high places like the so-called "flying" squirrels.

PTOLEMY, *tol'e my*, the name of a line of kings, who succeeded, on the division of the empire of Alexander the Great, to the part of his dominions of which Egypt was the head.

Ptolemy I (367-283 B C) (called Soter meaning the Savior) was by birth a Macedonian. On the death of Alexander he secured for himself the government of Egypt and made Alexandria a center of Greek culture. He was a great patron of art, learning and literature and founded the celebrated Alexandrian library. The lighthouse on the island of Pharos was built during his rule.

Ptolemy II (308-247 B C) succeeded his father and reigned in almost complete peace. His chief care as ruler was directed toward the internal administration of his kingdom.

Ptolemy III (282-222 B C) who was surnamed Euergetes, meaning the benefactor, brought Egypt to a very high stage of prosperity. He was not only a conqueror, but also, like his predecessors, a patron of learning.

Ptolemy V (210-181 B C) was not five years old at his father's death, and Philip of Macedon and Antiochus III of Syria combined to dispossess him and divide his dominions. To avert the threatened danger the guardians of the young king placed him under the protection of Rome, which thus had for the first time an occasion for interfering in the affairs of Egypt. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased and the inde-

pendence of the native sovereigns gradually decreased.

Ptolemy XIV (61-47 B C) reigned jointly with his sister, the famous Cleopatra, from 51 to 47 B C. In the latter year a dispute arose between them and the queen left Egypt. Caesar sent troops to support her, Ptolemy was defeated, and he was drowned in an attempt to escape. See Cleopatra.

Ptolemy XV (58-45 B C) another brother of Cleopatra, occupied the throne jointly with his sister for two years, when she murdered him to make Caesarion (her son by Julius Caesar) king.

PTOLEMY, a famous author who lived at Alexandria in the second century after Christ. Little is known of his life. He left a work on astronomy and another on geography, which were standard texts until the discoveries of the sixteenth and seventeenth centuries. According to the Ptolemaic system, the earth was a globe and the center of everything. Around it revolved the hollow sphere of the heavens. The moon and the sun revolved around the earth, but in circles of which the earth was not the center. There were seven planets, arranged according to distance from the earth in this order: the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn. See COPERNICUS; PLANET.

PTOMAINES, *toh'maynz*, a class of poisonous substances of animal origin, closely resembling alkaloids in their chemical composition (see ALKALOIDS).

Ptomaine Poisoning is caused by eating food that is in a state of decomposition, such as canned fish, canned meat and ice cream that has stood for a long time in a tin can. The symptoms are chilliness, headache, pain in the stomach and intestines and extreme prostration, accompanied by vomiting and purging, which are nature's attempts to cleanse the system of the poison. The treatment should consist in emptying the stomach and the intestinal tract as soon as possible, and in severe cases, to prevent total collapse, the administration of stimulants other than whisky. Recovery from slight attacks is usually speedy but severe attacks may become fatal.

PUBLIC DEFENDER. The Constitution of the United States provides that any person accused of crime shall have the assistance of counsel in his defense. However, it often happens that the accused has no money with which to pay a lawyer; in such cases the judge appoints some lawyer to defend the accused person. Usually the law-

yer appointed is inexperienced or lacking in ability, while the opposing state's attorney in the case is a man chosen for his position because of his ability. Under such conditions the interests of the accused may suffer.

A *public defender* is an attorney elected by the county to defend those accused of crime, or of violation of the law, when they do not have the means for employing an attorney. The public defender may also assist working people in the collection of wages due them, and he may act as attorney in small lawsuits for citizens who cannot afford to engage regular counsel. The first public defender in the United States was appointed in Los Angeles, Calif., in January, 1914. The plan has been copied in the police courts of Portland, Oregon, and in New York City, but most cities have hesitated to adopt this help for their unfortunates.

PUBLIC LANDS. See LANDS, PUBLIC.

PUBLIC UTILITIES, a term applied to various enterprises operated to serve the general public. The term includes in its broad sense the mail service, telegraph and telephone lines, express companies, the services supplying water, light, heat, and power, and steam and electric railroads. These are public utilities of long standing, but recently, by common agreement which is rapidly crystallizing into law, motor-bus service, local and interstate, is recognized as a public utility, and there are prophecies that at no far-distant day the universality of the radio will force at least its communications feature within the scope of legislation.

The foregoing conditions relate particularly to the United States and Canada. Everywhere the mail service is recognized as a proper government monopoly, and in many countries railroads, telephones, telegraph lines, and the radio have passed to government ownership or control.

Formerly all public utilities licensed under corporate laws in the United States were privately owned, and in their operation their managers were bound only by restrictions imposed by their franchises. Objections to many practices which gradually developed prompted legislation from time to time to restrict independent action and establish stronger safeguards in behalf of the public.

The Interstate Commerce Commission created in 1887 to supervise railway tariffs represented the first attempt by the United States government to exercise control over

public utilities. Since that date railroad commissions have been created in almost every state, and in December, 1917, the Federal government took over the railroads as a war measure. In the following July the telephone and telegraph lines were placed under government control. After the conclusion of peace these utilities were returned to their owners, but this experiment along the line of public ownership provoked a good deal of thought throughout the country relative to the respective merits of private ownership, government ownership and control, and limited government supervision of privately owned utilities. In most cities the water plants are owned and controlled by the municipality, and the same condition exists in lesser degree with respect to lighting.

There has been a belief in the United States that an economic principle has been established tending to continue the policy of private ownership and management of most public utilities, subject to strict regulation by law, and that the government should not engage in any business assumed to be the right of private enterprise. Within recent years there is evidence of intent on the part of the Federal government to enter gradually the public-utility field, particularly those enterprises furnishing power and light. See TENNESSEE VALLEY AUTHORITY.

PUCCINI, *poot ché-ne*, GIACOMO (1858-1924), one of the greatest composers of Italian opera. He was born at Lucca of a distinguished family of musicians. He studied at the conservatory of Milan, under leading masters, and in 1884 produced his first opera, *Le Villi*. *Edgar* followed, but was unsuccessful, owing to a poor libretto. *Manon Lescaut*, his first pronounced success, was produced in 1893. It was followed by *La Bohème*, which because of its lilting melodies is one of the opera-goer's favorites. *Tosca* was slow in gaining popularity because of its libretto, but *Madame Butterfly*, with its dramatic content brought Puccini unreserved praise in 1904. He wrote *The Girl of the Golden West*, a popular opera with an American setting. His *Turandot* was produced two years after his death.

PUDDING STONE. See CONGLOMERATE.

PUEBLO, *pueb lo*, the Spanish word for *village*, was the name originally applied to the villages of certain Indian tribes living in communities of adobe, or stone-built, houses in the arid regions of Arizona, New Mexico and

Mexico. The name is now applied to the Indians themselves, who are under the protection of the government. The ruins still to be seen in various parts of the Southwest show that the Pueblos at different times wandered about, abandoning one location and settling in another. Their houses are clustered tightly together, one frequently overlapping and rising above another. Narrow and crooked alleys separate the buildings into irregular blocks. There are no openings in the walls of the lower stories, except the narrowest of window slits, but the upper floors are provided with doors and windows. These homes are entered through the roof by means of movable ladders, which are drawn up at night.

The entire village, or community, works together on enterprises of general interest, such as the construction of irrigating ditches, although each family lives in many respects an independent life. The Pueblos subsist principally by agriculture, and the women are especially adept in weaving and in the making of pottery. The men are gayly clothed with robes and jackets, elaborately decorated with tassels and fringes. In some tribes the unmarried women are distinguished by a peculiar headdress. Physically these Indians are small in stature, but are very strong. The Pueblos number about 10,000, and represent four distinct families, of which the *Zuni* and *Hopi* (which see) are the most important.

PUEBLO, Colo., the second city in size in the state and the county seat of Pueblo County, is 122 miles nearly south of Denver, on the Arkansas River, at the mouth of Fountain Creek, and on the Atchison, Topeka & Santa Fé, the Colorado-Kansas, the Missouri Pacific, the Colorado & Southern (Burlington), and the Denver & Rio Grande railroads. There is a large airport. The city is near the eastern foothills of the Rocky Mountains, has an elevation of over 4,600 feet, and is in the immediate vicinity of extensive deposits of coal, oil and limestone. Although located in a good farming region it owes its prosperity mainly to its manufacturing and smelting interests. Its smelters treat gold, silver, copper, lead and zinc ores, while its immense steel plant, railroad shops, foundries, machine shops and other factories make it a principal manufacturing city of the Rocky Mountain region. The state asylum for the insane is located here,

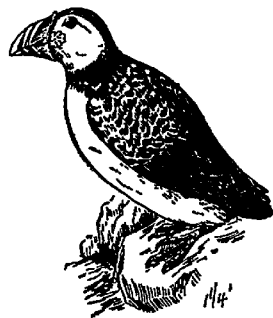
as is also the large hospital of the Colorado Fuel and Iron Company and several hospitals and sanitariums of lesser note. Other important institutions are schools of music, junior college, business colleges, the McClellan Library (in a fine Carnegie building) and the law library. Of Pueblo's numerous parks, the most important are Mineral Palace Park, which takes its name from the Mineral Palace, originally designed as a museum of mineralogy, and City Park, noted for the great variety of trees it contains. There is a large municipal auditorium. The commission form of government prevails.

The Mormons located here temporarily in 1846 and a trading post was established in 1850, but the traders were massacred by the Indians in 1854. The city was laid out in 1859 and secured its charter in 1873. Population, 1920, 43,050, in 1930, 50,096.

PUERTO RICO. See **PORRO RICO**.

PUFFBALL, a species of fungus related to the mushroom. The ball grows close to the ground, springing from extensively-branching, rootlike fibers. When young, it is white and fleshy and is good to eat; when mature it bursts open at the top and discharges millions of minute spores in a brown cloud that looks like smoke. The larger balls, some of them fifteen or twenty inches in diameter, "smoke" for several days and are said to discharge spores at the rate of a million a minute. See **MUSHROOMS**.

PUFFIN, a species of auk which migrates between the Arctic and north temperate regions. The body is about the size of a pigeon's, and the head is large. The beak is very conspicuous, and that of the male undergoes marked changes in the breeding season. Like most sea birds, these have neutral-tinted plumage, the breast and under parts being light, the wings and tail dark gray. Puffins live far out over the sea, coming to land only in the breeding season, and then in large colonies. The nests are



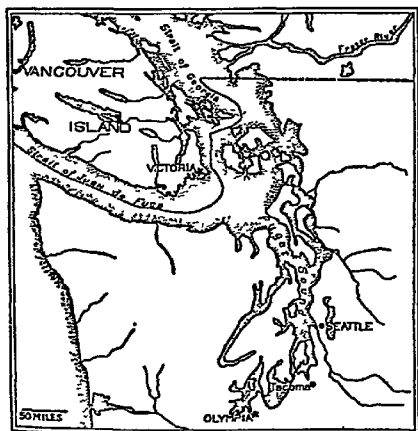
PUFFIN

among the rocks or in underground burrows, and in each a single egg is laid and hatched. In the far north the birds constitute a favorite article of food, and during the nesting seasons large numbers of them are captured in nets.

PUG, a small dog with a stout, compact body, weighing from ten to twenty pounds, and having a wrinkled face and short, black nose. Its hair is short and smooth, and usually fawn-colored. The tail curls upward in a tight coil over the back. The black pug is the same dog in every particular but color.

PUGET, pu'jet, SOUND, one of the largest inland harbors in the world, is an irregular inlet extending into the northwestern portion of the state of Washington, on the shores of which lie Seattle, Tacoma, Olympia, and other ports of great commercial importance because of their ocean traffic. Its shores are high and wooded, and its deep waters reflect the great expanse of scenic beauties for which the locality is noted.

Puget Sound is an inland extension of the straits of Georgia and Juan de Fuca, which separate the island of Vancouver from the mainland. The sound extends southward for about 100 miles and is divided into two branches; Hood's Canal is the western branch,



PUGET SOUND AND OUTLET

and Admiralty Inlet, the eastern branch. Puget Sound has extensive fisheries along its shores, and salmon packing and canning constitute one of the great industries of the region. See SEATTLE; TACOMA; OLYMPIA; WASHINGTON.

PULASKI, poo lah's'ke, CASIMIR (1748-1779), a Polish soldier who fought for America in the Revolutionary War. Born of a noble Polish family, at Podolia, and inspired by intense love of liberty, he fought in Poland's war for freedom and was exiled for alleged connection with a plot to abduct King Stanislas in 1771. At this time his estates were confiscated. A round of adventures in France and Turkey followed, and in 1777, after a meeting with Benjamin Franklin, he sailed for America and at Philadelphia joined the Continental army to aid in the fight for independence. He fought in the Battle of the Brandywine as chief of dragoons and was made a brigadier-general. At the head of an independent force of cavalry and light infantry, known as Pulaski's Legion, he served in the southern campaign, but was mortally wounded in a furious assault upon the city of Savannah, October 9, 1779.

PULITZER, JOSEPH (1847-1911), one of the greatest of American journalists, founder of the Columbia School of Journalism, was born in Budapest, Hungary. At the age of seventeen he emigrated to the United States, where he served for a time in the Union armies. He began his journalistic career on the *Westliche Post*, in Saint Louis, under Carl Schurz; of that paper he later became editor and proprietor. He was elected to the Missouri legislature in 1869, and was a delegate to the Liberal Republican convention in 1872, supporting Horace Greeley for the Presidency. Later he became identified with the Democratic party. In 1884 he was elected a member of Congress, but served only a few months. He founded the *Saint Louis Post-Dispatch* (combining the *Post* and *Dispatch*) in 1878, and purchased the *New York World* in 1883.

In 1889 Pulitzer became totally blind, but he did not diminish his labors in behalf of journalism and art until a few hours before his death. By his ambition and personality he rose from being a penniless emigrant to becoming one of the most influential publishers of his time.

The Pulitzer Prizes established by his will are awarded for distinguished public service rendered by an American newspaper, correspondence, editorials, cartoons, novels, plays, history of the United States, biography, poetry, scholarships in journalism, music and art. These prizes amount to thou-

sands of dollars and have served as a powerful stimulus to effort in literary fields.

PULLEY, a small wheel turning upon an axis. The rim may be flat or grooved, according to the use to which the pulley is to be applied. The frame in which the pulley is suspended is known as the block. Pulleys are of two classes, fixed and movable.

The Fixed Pulley. The *fixed* pulley is one which does not change its position and is used simply for the purpose of changing the direction of the force applied.

Movable Pulley. A *movable* pulley is one fixed in a movable block, which rises and falls with a weight. The law of equilibrium is that the weight is equal to the power multiplied by twice the number of movable pulleys. In the single pulley, shown in Fig. 1, there is no advantage. The lever arms r and R being equal, the point B is the same distance from C , the point of support, as the point A . Therefore, the power P must equal the weight W , when they are in equilibrium. In the movable pulley, Fig. 2, the weight W is suspended by two cords, each of which sustains one-half of it; hence, if the power, P , is one-half the weight, the pulley is in equilibrium.

Pulleys are used in derricks and tackle

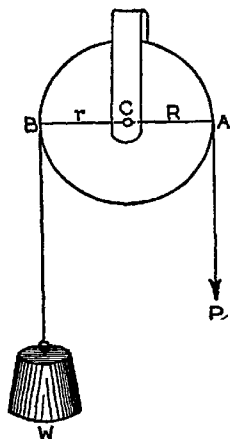


FIG 1

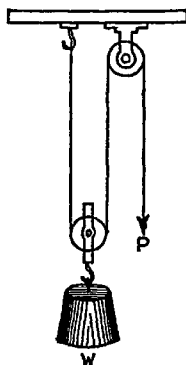


FIG. 2

blocks. In machinery the term *pulley* is applied to a wheel with a broad, nearly flat, face, used for carrying a belt which imparts motion to machinery. See **MECHANICAL POWERS**.

PULLMAN, GEORGE MORTIMER (1831-1897), an American inventor and capitalist,

born in Chautauqua County, N. Y. At twenty-two he contracted to remove warehouses along the Erie Canal, which was to be widened. Six years later, in Chicago, he became a building contractor and raised entire blocks of brick and stone buildings. In 1859 he made a sleeping car, since developed into the car known as the "Pullman," but it was eight years before he organized the Pullman Palace Car Company and began building cars for the railroads. About the shops grew up the industrial town of Pullman, which was annexed to Chicago in 1880. See **RAILROAD**, subhead *Equipment*.

PULMOTOR, a mechanical device for forcing artificial respiration. It is used in cases of drowning, electric shock and gas poisoning. The device contains a tank of compressed oxygen connected with an injector, by means of which air is mixed with the oxygen before it is inhaled. A mask, which is placed over the patient's face, is attached to the injector. A switch worked by the operator forces the oxygen and air into the lungs.

While the pulmotor in the hands of a skilful operator is a valuable device for restoring respiration, it is the opinion of scientists who have thoroughly tested its merits that its value has been greatly overrated, and that there are serious dangers attending its use, except in the hands of a skilled operator. It may suck the air from the small air cells in the lungs and cause them to collapse, and it is liable to pump air into the stomach. Moreover, unless artificial respiration is begun within ten minutes after the patient has stopped breathing, no efforts can revive him. In case of drowning, manual respiration should be begun at once, while waiting for the device to be brought. See **DROWNING**.

PULQUE, *pull'ka*, or **OCTLI**, the favorite beverage in Mexico and Central America, made from the fermented juice of the agave. It is cooling and wholesome, but if drunk in excess causes intoxication.

PULSE, *THE*, the wave movement of the blood through the arterial system. The movement begins in the heart, with the contraction of the ventricle which sends a volume of blood into the aorta, which is already full. The expansions of the walls of the aorta and their contraction as the blood moves on make the intermittent flow, which is easily felt in the radial artery of the wrist, in the temporal

artery of the temples and in the carotids of the neck. Any cause which affects the action of the heart affects also the pulse. In healthy adults the number of beats per minute varies from sixty-five to seventy-five, the most common rate being seventy-two. The pulse is quicker in children than in adults and slower in old age than in middle life. There is no pulse in the capillaries and veins. See SPHYGMOGRAPH

PULSE FAMILY. See LEGUMINOUS PLANTS

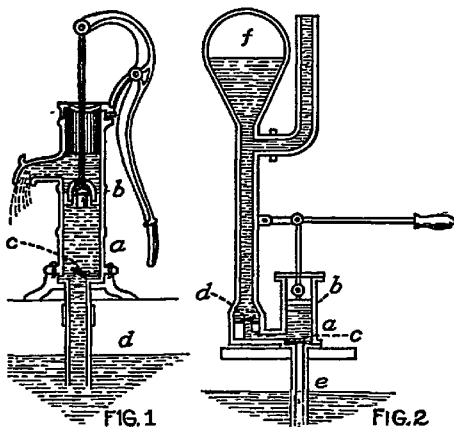
PUMA, one of the largest animals of the cat family, called, according to locality, *mountain lion*, *panther* and *cougar*. Large numbers of the animals were once found in the Rocky Mountains region, but they are now comparatively rare. The adult is about six feet long and weighs 200 pounds. It is usually reddish-brown above, white on the throat, breasts and insides of the legs and black on the tip of the tail and muzzle. A black streak runs along the back. The puma lives in trees, but does not spring down upon travelers unawares, as hunters once believed it did. It is less dangerous than other wild cats of its size, and does not often attack man. However, it is detested by ranchmen because of its destructiveness to domestic animals, especially sheep. One puma alone may kill a hundred sheep in a single raid.

PUMICE, *pum'is*, a volcanic rock of various colors, gray, white, reddish-brown or black, composed chiefly of glass. It is hard, rough and porous; it is lighter than water and consequently floats, and resembles the slag produced in an iron furnace. Pumice is really a loose spongy, frothlike lava. It is used for polishing ivory, wood, marble, metals and glass, and for smoothing the surfaces of skins and parchment.

PUMP, a device for raising liquids or removing gas from a closed vessel. The necessary parts of a pump are the barrel, the piston, the piston rod, the valves and the suction pipe. There are numerous patterns of pumps, but these can all be grouped under the following classes: suction pumps, including lift pumps and force pumps and centrifugal pumps.

The Suction Pump. This is the common household pump. It consists of a piston fitted to work air-tight in the barrel, and contains a valve opening upward. It is connected by a piston rod with the handle, by which it is moved up and down. At the

bottom of the barrel is another valve, also opening upward and closing the upper end of the suction tube. When the piston moves downward, the air in the barrel is forced up through the valve in the piston. As the piston rises, the pressure of the air closes this valve, and a partial vacuum is produced in the barrel. The water is forced upward in the suction pipe by the pressure of the air upon its surface in the cistern or well. The first few strokes of the pump exhaust the air from the barrel and the suction tube. As the air is exhausted the water continues to rise until it reaches the barrel. It is then pumped



MECHANISM OF PUMP

a Barrel	a Barrel
b Piston	b Piston
c Valve in Barrel	c Valve in Barrel
d Reservoir	d Valve in Stand Pipe
	e Reservoir
	f Air Chamber

out in the same manner that the air was exhausted. Under the most perfect conditions this pump cannot raise water over 28 or 30 feet, and it will seldom work satisfactorily for more than 24 feet.

The Lift Pump. This pump also has two valves and a piston above, opening upward, but it differs from the suction pump in being placed in the bottom of the cistern or well from which the water is to be raised, and in its ability to raise water to any desired height, while the efficiency of the suction pump is limited by the pressure of the air.

The Force Pump. There is in this pump no valve in the piston, but it has a valve opening outward at the point where the delivery tube is attached to the barrel. Most force pumps are double-acting—that is, they

have two pistons—and the water is forced from the pump into an air chamber, from which the elasticity of the compressed air draws it in a continuous stream.

Centrifugal Pumps are employed where the lift is not too great and the quantity of water is considerable. The common form consists of a wheel, shaped like an ordinary fan, with passages leading from its center to its circumference. This is made to rotate very rapidly in the casing. The circumference communicates with the delivery pipe, and the center connects with the pipe leading to the water supply. The rapid revolution which is in the wheel causes the water to flow from its center to its circumference, and in this way sucks the water up to the center of the wheel, from which it is carried to the circumference and thence out through the tube.

Power Pump. For large operations, gasoline or electric motors serve as motive power. A connecting rod is the medium between the power and the plunger. In newer types an impeller, an ingeniously contrived disk, takes the place of the plunger. This device is used in mine activities, irrigation projects, sewage disposal, and waterworks.

The Chain Pump. This is a pump with an endless chain passing over two wheels, one at the top and the other at the bottom of the well or estern. The chain contains circular disks that fit a tube through which the rising part of it moves when the wheels are turned. The lower end of this tube sits in the water, and as the chain continues to move it carries the water between the disks.

PUMPKIN, a coarse climbing plant and its fruit, a native of India, but cultivated in America and most parts of Europe. The fruit, which is of a reddish or golden yellow, sometimes acquires a diameter of two feet. It has a tough, stringy pulp, which when cooked with other ingredients makes a delicious filling for pies. On Hallowe'en it is the custom to use the pumpkin shell for jack-o'-lanterns.

PUNCTUATION, the use of certain symbols in written and printed composition for the purpose of making the thought clearer. Punctuation marks are placed between whole sentences and within sentences to separate the different parts. There are no punctuation marks in the old Greek and Roman manuscripts; even the words are not separated. This running of all the words together makes

them very difficult to read. First of all, authors began to correct this by separating the words, either by spaces or by dots. Next, they learned to place a full stop after sentences, but it was not until the beginning of the sixteenth century that a real system of punctuation was devised; our present marks are in a great degree due to the wisdom and invention of Aldus Manutius, a Venetian, who died in 1515. The principal marks of punctuation used at present are the period (.), the colon (:), the semicolon (;), the comma (,), the interrogation point (?), the exclamation mark (!), the dash (—), and the parentheses ().

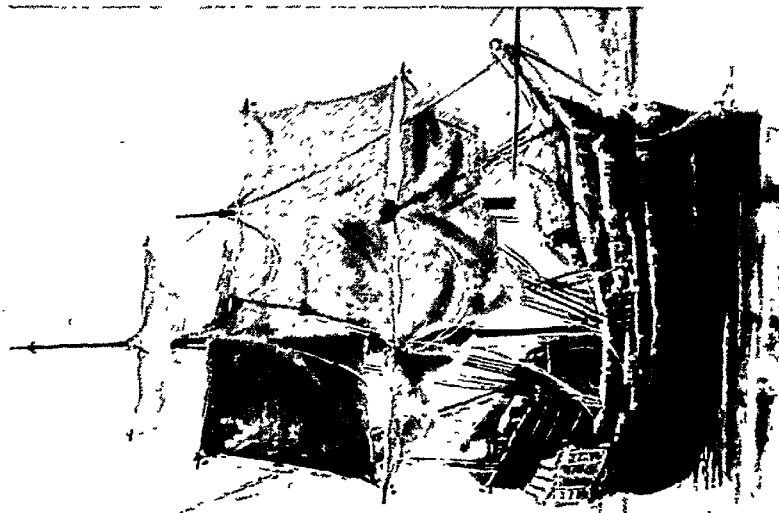
PUNIC WARS, the name given to three great wars waged between Rome and Carthage. The first lasted from 264 to 241 B. C., the second from 218 to 201 B. C., and the third from 149 to 146 B. C. In all three of these struggles the Romans were victorious, in the first gaining Sicily, in the second acquiring Spain, and in the third completely crushing the enemy's power and establishing their own world supremacy.

Related Articles. Consult the following titles for additional information
 Carthage Rome
 Hamilcar Barca Scipio, Publius
 Hannibal (father and son)

PUNJAB, *pun'jabb*, a province in the northwestern part of British India. The name, meaning "five rivers," refers to five important streams that drain the region it occupies. The area of the Punjab is 133,741 square miles, of which 99,779 square miles are under a British lieutenant-governor; the remainder is administered by native rulers under British suzerainty. See **INDIA**.

PUNTA ARENAS, *poon'tah ah ra'nahs*, **CHILE**, the most southern city of the world, since 1928 known as **MAGALLANES**, is on the Strait of Magellan at the south end of South America. It is 1,414 miles from Valparaiso, Chile; 3,928 miles from Panama, 6,184 miles from San Francisco; 6,980 miles from New York, and 4,036 miles from Cape Town, Africa. It is the capital of the Chilean territory of Magallanes, and is important as a coaling station for steamships. The seal fisheries are of some value. Punta Arenas is a town of muddy streets and log houses. It was founded in 1849, on the site of a former penal colony. Population, 1930, 24,307.

PUPA, the intermediate form between egg and insect in the life history of certain



COMPACT OF THE PILGRIMS

In the cabin of the *Mayflower*, on the evening of November 11, 1620, the forty-one heads of the families on board signed the "Compact of the Pilgrims," the first instrument of civil government ever subscribed to by all the people concerned

In ye name of God, Amen We whose name are underwritten, the loyall subjects of our dread sovereigne Lord, King James, by ye Grace of God, of Great Britaine, France & Ireland King, Defender of Ye Faith, etc Having undertaken, for ye Glorie of God, and advancements of ye Christian Faith and Honour of our King and countrie, a Voyage to plant ye first Colonie in ye Northerne part of Virginia, doe by these presents solemnly and mutually in ye Presence of God, and of another, Covenant & Combine our selves together into a Civill body Politick, for our better Ordering & Preservation & Furtherance of ye ends aforesaid, and by Vertue hereof to enact, constitute, and frame such just & equall lawes, ordinances, Acts, Constitutions & Offices, from Time to Time, as shall be thought most meete & convenient for ye generall good of ye Colonie, unto which we promise all due submission and obedience





- (1) Migration to the Continent, 1606-1607, (2) settled in Leyden, 1609, left Leyden (3) and Delfs Haven (4) in July, 1620, on the "Speedwell", (5) sailed August 5 on "Mayflower" and "Speedwell" from Southampton for the New World, (6) returned to Plymouth because of the unsavoury "Speedwell", (7) "Mayflower" sailed alone, with 102 on board, September 6, (8) Cape Cod sighted, (9) Compact of the Pilgrims signed in cabin in Provincetown harbor, November 11, (10) "Mayflower" anchored in Plymouth harbor, December 21.

small creatures The butterfly lays an egg which develops into a worm; and the worm encloses itself in a chrysalis, from which a butterfly emerges. In this casing the animal is a pupa. In a cocoon the moth is in its pupal stage. See BUTTERFLY; COCOON.

PURDUE UNIVERSITY, a state institution of higher learning, established at Lafayette, Ind., in 1869. The university is really an institute of technology and comprises schools of mechanical, civil and electrical engineering, agricultural science and pharmacy. All students are required to spend an average of three hours a day in laboratory, shop or field. The faculty numbers about 425, and there are more than 4,200 students. The library contains 70,000 volumes.

PURE FOOD LAWS are laws intended to safeguard the purity of drugs and foods. To mix unwholesome substances in anything intended for food is an offense against the law. Most states, in furtherance of public health, prohibit by statute the sale of adulterated or misbranded foods and drugs, and Congress enacted a federal pure food law in 1906.

In general terms, products are considered adulterated if unhealthful ingredients have been added or wholesome ingredients generally used withheld; if they do not attain a certain recognized standard of purity and strength, or if prepared from unwholesome ingredients, or by the employment of unsanitary methods; if, to prevent decay, noxious means and preservatives are used; or if such products constitute an imitation of some other commodity. Products are regarded as misbranded if the labels on the packages or cans convey misleading information.

In the enforcement of the federal law, questions requiring the most painstaking investigation are constantly rising. It is found that benzoate of soda and a number of aniline dyes, when pure, are harmless. The benzoate of soda may be used as a preservative, and these dyes may be used for coloring. But we should remember that preservatives should not be used, because preserved food is likely to be of an inferior quality. This statement, however, does not apply to the use of salt and smoke for preserving meats. See ADULTERATION.

PURGATORY, an intermediate state between earth and heaven, according to Roman Catholic belief, in which the souls of those

who die penitent are purged of pardonable sin. It is believed that souls in purgatory are benefited by earthly prayers offered in their behalf.

PURITANS, a name first given about 1564 to those who wished to reform the Church of England. Queen Elizabeth, though upholding the national Church, had retained many of the ceremonies and vestments of Roman Catholic Church worship and had thus antagonized a large part of the Protestant party, who wished to have the Anglican Church differ more decidedly from the Roman Catholic. At the close of her reign, the Puritans were of three classes—those who desired a changed worship but wished to remain in the Church; those who wished to adopt Calvinism as the Established Church, and those who did not believe in the Established Church, but thought that each congregation should govern itself. These were led first by Robert Brown and were known as Brownists, but later were more generally called Separatists or Independents.

The Puritans gained in strength in the reigns of James I and Charles I, in spite of great efforts to overthrow them, and they took the leading part in the Civil War, which resulted in the establishment of the Commonwealth. With the restoration of the Stuarts in 1660, the Act of Uniformity placed the Puritans in the position of dissenters, and many emigrated to America, whither a large number of their comrades had already gone as early as 1620. Plymouth and Massachusetts Bay, New Haven and Connecticut were in the beginning Puritan commonwealths.

Conspicuous characteristics of the Puritans were unswerving devotion to duty and love of righteousness. Often they were narrow and intolerant. See PILGRIMS; MASSACHUSETTS, subhead *History*.

PURSLANE, *purs'tayn*, commonly called *pursley* or *pusley*, a trailing weed, a pest in gardens, found in all warm parts of the world. It is a short-lived annual, with small yellow flowers that open only in the early part of the day. Purslane is used in some parts of the world in salads, and in France its young shoots are pickled like gherkins.

PUTNAM, ISRAEL (1718-1790), an American soldier, born at Old Salem, Mass. When the French and Indian War broke out he joined the army and rendered good service throughout the war. He was taken prisoner by the French and fell into the hands of the

Indians, who tortured him cruelly. In the disturbances which led up to the Revolutionary War, Putnam showed himself a most determined opponent of British aggressions, and when the war broke out he joined the army. He was present at Bunker Hill and later destroyed much British shipping on the expedition to Noddle's Island. In 1775 he commanded the army at Long Island, and in the following year took part with Washington in the operations in New York and New Jersey. Hartford, Conn., erected a fine monument to him, the work of J. Q. A. Ward.

PUTNAM, RUFUS (1738-1824), an American soldier and frontiersman, born at Sutton, Mass. He fought in the last French and Indian War, served in the Revolutionary War, part of the time as an engineer and part in active military service, winning the rank of brigadier-general. In 1786 he organized, with Benjamin Tucker, Manasseh Cutler and others, a company of revolutionary veterans for the purpose of settling the district of Ohio, and he was one of the three directors of the Ohio Company. Partly through his influence, Congress passed the Ordinance of 1787, establishing a civil government in the territory. In the same year it sold to the Ohio Company a million and a half acres at the junction of the Muskingum and Ohio rivers. There, in the following year, Putnam established the town of Marietta. In 1796 he became surveyor-general of the United States.

PUTREFACTION, the decomposition of dead organic matter, which is usually accompanied by the rise of ill-smelling gases. It is now known to be due to the agency of bacteria or other organisms, which find their way to the dead matter and multiply rapidly therein. The substances in which these bacteria are thus developed separate into their original elements or are reduced to much more simple compounds. The decay of animal substances is usually accompanied by more poisonous and fetid exhalations than come from the decay of vegetable products. Ammonia or ammoniacal compounds and other combinations of hydrogen, together with other highly infectious vapors and gases, are formed in most cases of animal putrefaction. Chlorine will usually render these harmless. The rapidity of putrefaction and the nature of its products are to a great extent dependent upon temperature, moisture and the access of air. Substances

decay most rapidly in a temperature of between sixty and eighty degrees, where there is considerable humidity and a free access of air. Putrefaction, then, may be checked or altogether prevented by a very high or a very low temperature, by excluding the air and by keeping the body dry. Certain antiseptics prevent, and to some extent arrest, the progress of putrefaction. See **BACTERIA** AND **BACTERIOLOGY**; **FERMENTATION**.

PUTTY, a cement made by mixing whitening (chalk) with linseed oil. It is used by glaziers to fix glass in position and by painters to fill cavities in wood surfaces. A putty used as a finishing coat in plastering is prepared with slaked lime, dried to the consistency of soft dough and mixed with plaster of Paris. A putty used by mechanics in making pipe joints, called *red-lead putty*, is made of powdered red lead mixed with boiled linseed oil.

PYGMALION, *pig mǎ'le on*, a legendary Greek sculptor. He shunned women, because all of them fell short of his ideal. He made a life-sized statue embodying in it his ideas of womanly grace and beauty, and when he had finished it the form was so exquisite he fell in love with it. He prayed fervently that his ideal might be made real and that the woman of his dreams might be endowed with life. His prayer was answered, and one day Galatea, his lovely creation, stepped down from her pedestal and became his wife.

PYGMIES, *pig'miz*, a race of dwarfs, first mentioned by Homer in the *Iliad* as dwelling in a region far to the south and as having to sustain a war against the cranes every spring. Later writers trace them as native to the interior of Africa. Pygmies are divided into two groups—the African and the Asiatic, the latter called Negritos. They somewhat resemble apes in facial appearance, and have the habits of a primitive people. They live in huts made of branches and foliage and subsist by hunting and fishing.

PYLE, HOWARD (1853-1911), an American illustrator and author, whose illustrations for children's books, pictures of the sea and of colonial scenes have an individuality and originality which give them a distinct place in American art. Pyle was born in Wilmington, Del., and he studied art in Philadelphia and in New York. For a time he was an instructor in Drexel Institute, Philadelphia; later he settled permanently in New

York, but died in Florence, Italy. He was one of the foremost of American illustrators, gifted with a keen sense of humor, a bold and original imagination and distinct literary ability. His best work was done for children. Among the books he wrote and illustrated are *Merry Adventures of Robin Hood*, *Twilight Land*, *The Champions of the Round Table* and *The Story of Sir Launcelot*.

PYM, *pim*, JOHN (1584-1643), an English statesman who was foremost in opposition to the tyranny of Charles I. He was born at Brymore, in Somersetshire. While a member of the Parliament of 1621 he attracted attention by his stand against the royal encroachments on Parliamentary privileges. In the first three Parliaments of Charles I he was also prominent, and on the assembling of the Short Parliament, in 1640, was recognized as its leader. The refusal of Parliament to grant supplies to Charles I until certain reforms had been promised was instituted under Pym's guidance. The impeachment of Strafford and the trial of Laud, undertaken by the Long Parliament, were conducted under his direction, and he was one of the five members whom Charles attempted to arrest. He died before the civil war between the king and Parliament had progressed far.

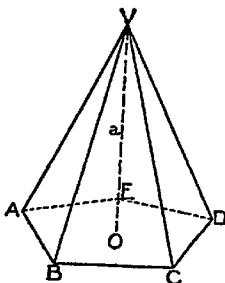
PYORRHOEA, *pi or'e'a*, a disease which causes the gums to swell and the teeth to become loose. It is an infection of the sockets to which the roots of the teeth are attached, and if not checked makes extraction of the teeth necessary. Pus also forms in the diseased tissue and this is itself a source of infection, often causing grave organic diseases. Persons with a tendency to pyorrhoea may avoid it by giving scrupulous attention to the care of the teeth. If a case develops a reliable dentist should be consulted at once.

PYRAMID, *pir'a mid*, a geometric solid, whose base is a polygon and whose sides are triangles meeting in a common point called the *vertex*. Pyramids are said to be triangular, quadrangular, pentagonal, etc., according as their bases are triangles, quadrilaterals, pentagons, etc. The pyramid is called *right* or *regular* when its base is a regular polygon and a perpendicular dropped from the vertex to the base will pass through the center of the base. The volume of a pyramid is equal to one-third the area of its base multiplied by the perpendicular distance from the vertex to the base, called the *altitude*.

To find the relation between a pyramid and a prism, construct a prism of cardboard, then construct a pyramid having an equal base and altitude. Fill the pyramid with sand and empty it into the prism. It will require three pyramids full of sand to fill the prism.

Since the sides of a pyramid are triangles, (as ABV), its lateral area is equal to the product of the perimeter (ABCDE) by one-half the height of the triangle, which is a line extending from the middle point of the side to the vertex and is known as the *slant height*.

When the base of a pyramid is an equilateral triangle, and all its faces are equilateral triangles, it is called a *tetrahedron*. This figure is one of the five regular geometric solids.



PYRAMIDS, the royal tombs of ancient Egypt, "the highest, costliest, and cruellest tombs the world has ever seen." The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about twenty-five miles from north to south. There are about seventy-five in number, built

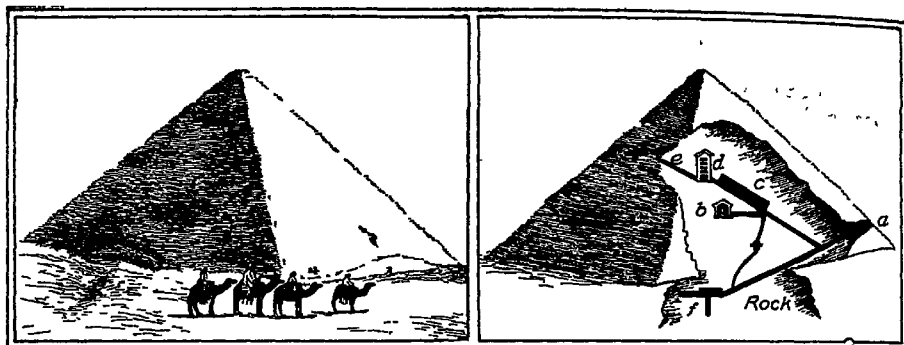
chiefly of the hard limestone of the adjacent hills, although large blocks of granite brought from a distance also were used.

The most celebrated of the pyramids, a group of three near Gizeh, were numbered among the Seven Wonders of the Ancient World. These are located four miles southwest of Cairo, in the neighborhood of ancient Memphis. The largest, erected by Cheops (Khufu), is called the Great Pyramid; Chephren (Khafra) and Mycerinus (Menkauru) built the others.

The Great Pyramid is said to contain 2,300,000 stones, ranging in weight from two and one-half tons to fifty tons each. According to Herodotus, Cheops employed 100,000

men for twenty years to complete the building of this pyramid alone. Its base forms a square, each side of which was originally 768 feet, though now, by the removal of the coating, it is only 750 feet long, and covers a space of 18 acres. The outer surface forms a series of steps, each of the average height of three feet or more. When the structure

In Other Parts of the World. Ruins of pyramids are to be found at Benares, in India and in other parts of the East. Certain monuments of the ancient inhabitants found in Mexico are also called pyramids. These seem to have been intended to serve as temples, the tops being flat and surmounted by a house, or chamber, in which sacred rites were



PYRAMIDS

The Great Pyramid of Cheops, or Chufu.

a Entrance c Grand Gallery e Air
b Queen's Chamber d King's Chamber f 592 feet from top

was perfect, this step formation was hidden by the coating which rendered the sides quite smooth, and the apex, where there is now a space of twelve square yards, was no doubt originally quite sharp. The height, originally about 480 feet, is now only 451 feet, through the slow processes of destruction.

The interior, entered forty-nine feet above the base of the north face, contains several chambers, one of which, called the King's Chamber, is thirty-four and one-half feet long, seventeen feet wide and nineteen feet high, and contains a sarcophagus of red granite. About 350 yards southwest of this pyramid is the celebrated Sphinx, described elsewhere in these volumes.

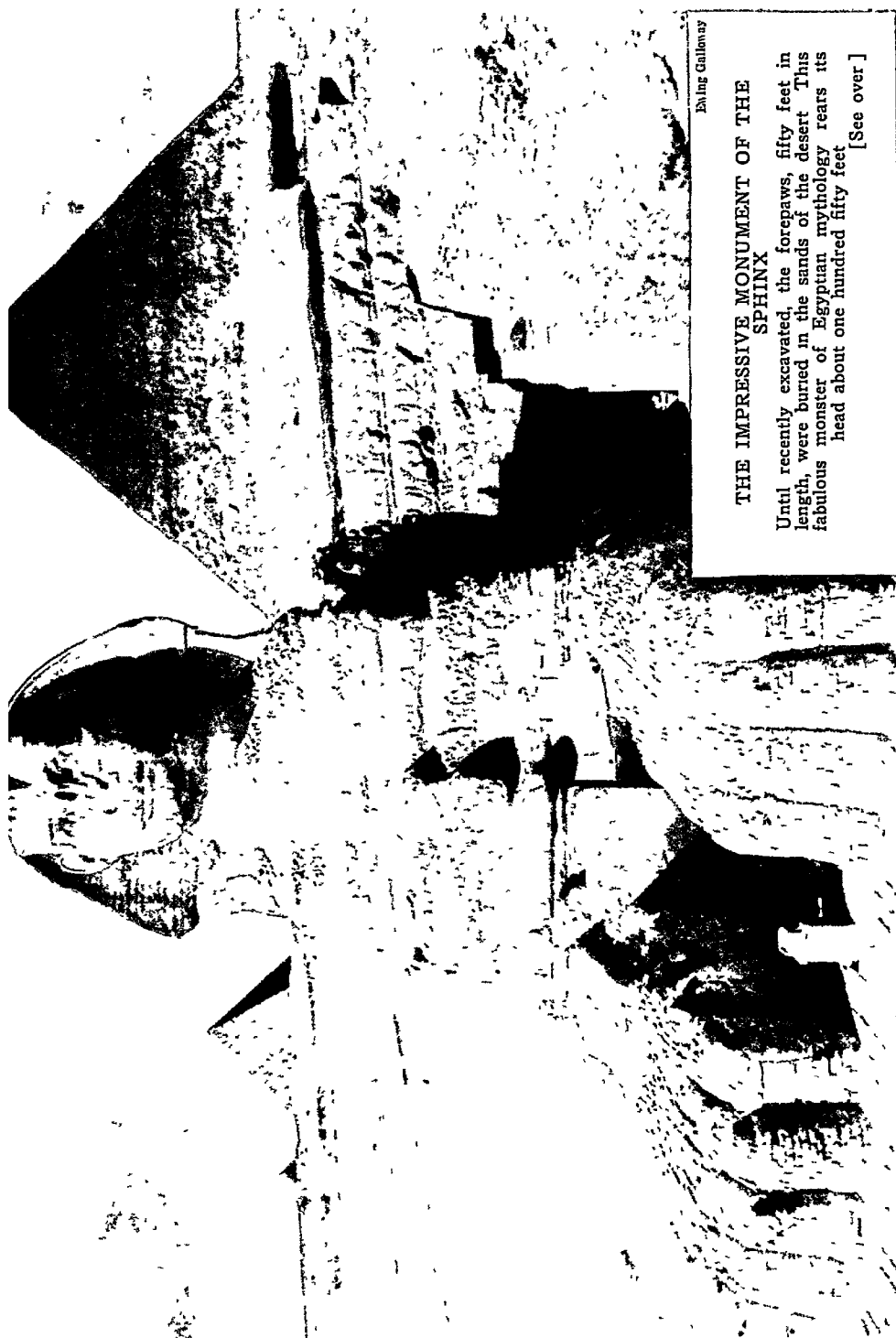
The second pyramid is 690 feet square and 447 feet high; the third is only 354 feet square and 203 feet high and is the best constructed of the three.

It is believed that when a king ascended the throne, he began to build a small tomb for himself, each year adding to it a fresh coating of stone, so that at his death the sides of the pyramid were like long flights of stairs. After the body of the king had been laid in the innermost chamber, the door was walled up and the smooth sides of the pyramid made his finished tomb.

probably performed. The largest, and perhaps the oldest, is that of Cholula, in Central Mexico, said to have a base of 1,770 feet and a height of 177 feet. However, when pyramids are referred to, those of Egypt are almost invariably brought to mind.

PYRAMUS AND THISBE, a pair of devoted lovers of Babylon, who were prevented by their parents from meeting openly and were therefore in the habit of secretly conversing through an opening in the wall of their adjoining houses. They agreed one day to meet at the tomb of Ninus, and Thisbe, who was first at the meeting-place, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seized in her bloody jaws. Pyramus appeared shortly afterward, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe on her return found the body of her lover and in despair put herself to death. The story, as told by Ovid, was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream*.

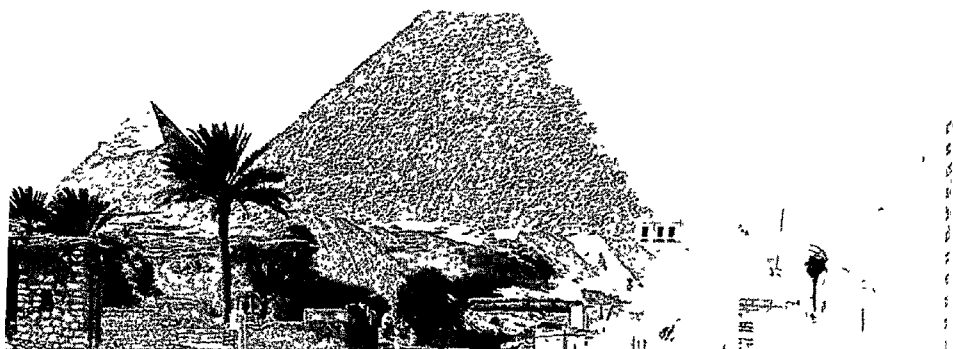
PYRENEES, *pir'e nees*, a lofty mountain range of Europe, the crest of the main chain of which forms the boundary between France



Eding Gallows

THE IMPRESSIVE MONUMENT OF THE SPHINX

Until recently excavated, the forepaws, fifty feet in length, were buried in the sands of the desert. This fabulous monster of Egyptian mythology rears its head about one hundred fifty feet [See over]



Living Landscapes

AGE-DEFYING PYRAMIDS ON EGYPT'S PLAIN

Typical village, in the shadow of the mighty Pyramid of Cheops At right: Close view of the rough stones of Cheops Below: Irrigation is practiced today as it was two thousand years ago

[See over]



and Spain. It extends from the Mediterranean to the Atlantic; its length from Cape Creux, on the Gulf of Lyons, to Fuenterrabia, on the Bay of Biscay, is about 270 miles, and its greatest breadth is little more than fifty miles. It consists of two lines, which form parallel ridges about twenty miles apart, except in the center, where the distance between them is considerably greater. The descent on the south side is much more abrupt than on the north. The loftiest summits are nearly all near the center, where the culminating point, the Pic d'Anethou, reaches a height of 11,168 feet. In the Pyrenees is to be found some of the finest scenery in France. The climate is mild, and the snow line is over 1,000 feet higher than that of the Alps. The chief passes of the Pyrenees are the Col de Somport and the Col de la Perche. In 1919 a Franco-Spanish tunnel under the mountains was completed. Its terminals are Aix, France, and Puigcerda, Spain, which are about twenty miles apart.

PYRITE, or **PYRITES**, *pir'rites*, in mineralogy, a term applied to the combination of iron, copper or arsenic with sulphur, forming a sulphite. The word means *flint*, or a stone that strikes fire, and the name is applied to this class of minerals, because of the fact that when struck with steel or some other hard substance, a spark usually results. In ordinary usage, the term is confined to *iron pyrite*, which is a compound of iron and sulphur. It has a bright luster and a brassy, yellowish color, and because of this it is often mistaken for gold. The mineral occurs in crystals in the form of cubes and in mass; it is also sometimes found in fine grains in decaying rock. It is used in the manufacture of sulphuric acid and green vitriol, or copperas. *Copper pyrite* is sometimes smelted for the metal, and some deposits contain more or less gold and silver.

PYROMETER, an instrument used for measuring high degrees of temperature. The old style pyrometer, and one still found in physical laboratories, consists of a metallic bar, fixed in a frame so that when heated it will extend in one direction. The movable end is connected with a needle, which passes over a dial. As the bar extends, it moves the needle, and this indicates the degree of heat applied. This instrument is of no particular value, except to indicate the expansion of metals. Another pattern in general use and much more successful than the former con-

sists of a metallic tube with a bulb containing air, pressing against a column of mercury which it supports. The temperature is measured by the expansion of the air. The higher the temperature, the greater the expansion, and, consequently, the greater the extent to which the mercury in the tube will rise. Still another pattern consists of a coil of platinum wire, encased in a porcelain or fire clay tube. The degree of heat is indicated by the resistance which the wire affords to the passage of an electric current, this resistance being measured by a galvanometer.

PYROTECHNY, *pi'rotek'ny*, the science of making fireworks, combustible and explosive material usually contained in a paste-board case. The materials chiefly used are niter, sulphur and charcoal, chemicals being added to produce colored lights or scintillations in burning. See **FIREWORKS**.

PYROXENE, or **AUGITE**, a mineral composed of silica, calcium and magnesium, often combined with iron, and sometimes with zinc and manganese. It occurs in prismatic crystals and also in granular form. There are colorless varieties, to each of which a specific name is given, but they are of no special interest except to the mineralogist. The varieties containing aluminum and small quantities of potash, soda or lime are of a dark color and constitute some of the common minerals. They are found crystallized in limestone and other common rocks. Pyroxene is an important constituent of many igneous rocks, and with labradorite or magnetite it forms basalt.

PYRRHUS, *pir'rus*, (318-272 B C), king of Epirus, one of the most illustrious generals of antiquity. He was placed on the throne of his deposed father when twelve years old, but was banished in 302. He fought in the Battle of Ipsus, went to Egypt as a hostage for Demetrius, and there married the stepdaughter of Ptolemy Soter. Afterwards he returned to Epirus, regained his throne after the Battle of Aetolia, and then planned the conquest of Macedonia, in which aim he was defeated by Lysimachus (286 B C). For several years then he was inactive.

In 281 Pyrrhus went to the assistance of the Tarentines, a colony in lower Italy, in their struggle with the Romans, and in 279 won his celebrated "Pyrrhic victory," at the Battle of Asculum—an engagement in which his losses were so heavy that he exclaimed,

"Another such victory and I shall be ruined." As an ally of the Sicilian Greeks at war against Carthage he was defeated, in 275. He returned to Greece, and again attempted the conquest of the Macedonians and the subjugation of the Peloponnesians. In a campaign against the latter he was killed.

PYTHAGORAS, *pi'th ag'o ras*, (about 584-510 B. C.), a Greek philosopher and mathematician, of whose life little is known. It is thought that he was born at Samos, that he traveled extensively and studied in many lands. About 530 B. C. he settled in the Greek city of Crotona, in lower Italy, and there founded among the aristocracy a brotherhood which became famous. The Pythagoreans believed in the transmigration of the soul and taught self-restraint, temperance, obedience and simplicity. They did much for the study of mathematics.

It is quite certain that Pythagoras discovered the proof of the proposition that the square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides. This is known as the *47th problem in Euclid*, or the *Pythagorean theorem*. The Pythagoreans were looked upon with suspicion, and in a popular uprising many of them were killed. There is reason for believing that Pythagoras had withdrawn to Metapontum and escaped the fate of his friends.

PYTHAGOREAN THEOREM, a famous proposition enunciated by Euclid, forming the forty-seventh theorem in the first book of his *Elements*. It proves that the square on the hypotenuse of any right-angled triangle is equal to the sum of the squares on the other two sides.

PYTHIAN GAMES, *pi'th'i an*, one of the four great national festivals of the Greeks, instituted in honor of Apollo and celebrated at Delphi. Until about 536 B. C. they were under the management of the priests of Delphi and took place every ninth year; afterwards they were conducted by the Amphictyons and were celebrated every fourth year. Prizes were given for flute playing, for athletic sports and for horse and chariot racing. Eventually, contests in tragedy, painting, sculpture and other intellectual and artistic accomplishments were added. At first, prizes of silver or gold were

awarded, but later the laurel wreath and palm branch were substituted. These games continued to be celebrated until the end of the fourth century of our era.

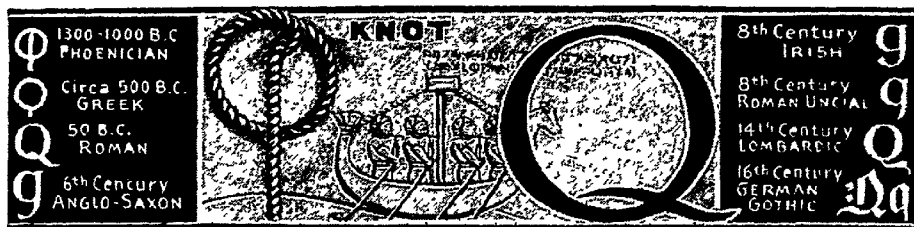
PYTHIAS. See DAMON AND PYTHIAS.

PYTHIAS, KNIGHTS OF. See KNIGHTS OF PYTHIAS.

PYTHON, *pi'thon*, an enormous snake, one of the most powerful creatures of the tropical forests of Asia, Africa and Australia. The reptile often weighs many hundred pounds and measures about thirty feet in length. It is possessed of terrific strength, and though it has no poison fangs it is feared by even tigers and buffalo, which it has been known to overcome by squeezing. It lives in trees, usually near streams, and seizes the small animals it feeds on when they come to drink. Animals as large as sheep it swallows whole, first crushing the bones and mangling the body into a sausage-shaped mass. The female lays about a hundred eggs, coils herself over them and there remains, without food, until they are hatched—a period of about two months. Some of the pythons are beautifully-colored. On the western coast of Africa they are venerated by certain tribes and are cared for in temples.

PYTHON, in Greek legend, a huge serpent born of the slime and slough which remained on the earth after the great deluge which destroyed all mankind except Deucalion and Pyrrha. He lived in a cave on Mount Parnassus, and preyed upon domestic animals and even human creatures. Finally Apollo killed him with his golden darts. The famous statue of the Apollo Belvedere represents Apollo just after he has slain the python. This myth is doubtless a mere personification of natural phenomena. The python represented the stagnant pools and marshes which breed malaria, and Apollo represented the sun which dries up such pestilence-breeding spots.

PYXIE, **FLOWERING MOSS**, or **PINE-BARREN BEAUTY**, a small evergreen trailing plant, common in New Jersey and North Carolina. It is one of the most beautiful of the early spring plants. Its slender stems, which extend over the ground in all directions, bear small evergreen leaves, which are, however, almost hidden by the flowers. The buds are pink; the open flowers, waxy white.



Q, the seventeenth letter in the English alphabet, a consonant having the same sound as *k* or hard *c*. It is a superfluous letter in English, as the combination *qu*, in which it always occurs, could be equally well expressed by *kw*, or by *k* alone when the *u* is silent. It came originally from the Phoenician alphabet, in which it was called *goph*. The Greeks did not use it because they had no need for it, but the Romans revived the letter and employed it in the same manner as it is used to-day.

QUADRANT, *kwahd'rant*, an apparatus once employed in navigation and in surveying. It was variously constructed, and had a graduated arc of 90°, or one-fourth of a circle, hence the name. It was used in determining angular altitudes, a service now performed by the sextant (which see).

QUADRILATERAL, *kwod'rila'ter'al*, a plane figure having four straight lines. A *trapezium* is a quadrilateral no two sides of which are parallel; a *trapezoid* is a quadrilateral two sides of which are parallel; and a *parallelogram* is a quadrilateral in which the pairs of opposite sides are parallel. Three classes of parallelograms are important—the rectangle, all the angles being right angles; the rhombus, none being right angles and the adjacent sides equal; and the rhomboid, none of the angles being right angles and the adjacent sides unequal. See **POLYGON**.

QUADRILLE, *kwahd'ril'*, a dance of French origin, which consists commonly of five consecutive figures or movements, danced by four couples. It was introduced into England in 1815 and from that country was taken to America.

QUADROON, *kwah'droon'*, the name given to a mixture of European and negro races, of three-fourths white and one-fourth black blood. The first mixture is called *mulatto*; the second, *tierceroon*; the third, *quadroon*; the fourth, *quintroon*, etc.

QUADRUPLE, *kwahd'ru'pl*, **ALLIANCE**, a league formed in 1718 by Great Britain, France, Austria and Holland in opposition to Spain, when that country seized Sardinia and Sicily and thus jeopardized the balance of power in Europe.

Another Quadruple Alliance was formed in 1840, by Great Britain, Austria, Russia and Prussia, for the purpose of curbing the power of Mehemet Ali. The alliance between Germany, Austria, Turkey and Bulgaria in the World War is sometimes given that name.

QUAESTOR, *kwes'tor*, the title given to a magistrate in ancient Rome. The earliest quaestors conducted the prosecution of a certain class of criminals. Later quaestors were entrusted with the charge of the public treasury. For centuries there were only two quaestors, but as the Roman republic increased in size more were added; in the time of Caesar there were forty.

QUAIL, a small game bird. Several species are found in America, the best known



CALIFORNIA QUAIL

being the *bobwhite*, so named in imitation of its call. This bird ranges throughout the eastern part of the continent, from the Gulf of Mexico into Canada. It is nearly a foot long, and is very plump. The plumage on the upper parts is reddish-brown mingled with black, buff and gray; the cheeks, throat and under parts are white. Bobwhite lives on and near the ground, rarely perching on branches, and feeds on berries, seeds and such. From ten to eighteen eggs are laid in a nest among the grasses. The several species of quail in the South and West in some respects differ markedly from the Eastern birds. The peculiarity of the California quail is a crest of six feathers, erect and curved. Nearly all quails are finely-flavored and are in demand for the table.

QUAKERS, or **SOCIETY OF FRIENDS**, a religious sect founded in England in 1648 by George Fox. The name "Quaker" was applied to them because of Fox's exhortation to "tremble at the word of the Lord." Their belief, as originally announced and not materially changed to this day, differs but little from the main creeds of orthodox believers.

From the first the Quakers were persecuted and many emigrated to America. In 1827, Elias Hicks, a Quaker of great influence and strong mental gifts, created a schism among the denomination in the United States by denying the immaculate conception, the divinity of Christ and the inspiration of the Scriptures. Many Quakers became converts of Hicks, and they have since been known as Hicksite Quakers, while the adherents to the old faith are called Orthodox Quakers. In the United States the number of Quakers is about 115,000.

The Quakers are marked by a number of peculiarities, both in their method of worship and in their ways of life. They have no ordained preachers, and in their meetings each individual speaks "as moved by the spirit." They do not baptize nor partake of the Lord's Supper, and they keep no holy days except Sunday. The congregation is divided according to sex, the men sitting on one side of the "meeting-house" and the women on the other. It is the duty of the women to inspect and relieve the wants of the poor of their own sex and to look after proposals for marriage. The Quakers neither take nor administer oaths, and they object to war, no matter how justifiable it appears to

be. All questions of discipline and executive management are settled in meeting; but the government of the body is exceedingly simple, and it is seldom that any serious differences occur among its members. President Hoover was America's only Quaker Chief Executive.

QUANTITY, *kwaht'nti ti*, the property by virtue of which anything can be measured, increased or diminished. In mathematics numbers are symbols representing quantities (see **NEGATIVE QUANTITY**; **ALGEBRA**). In music, by quantity is meant the relative temporal length of a note; in prosody, the term denotes the temporal length of a syllable.

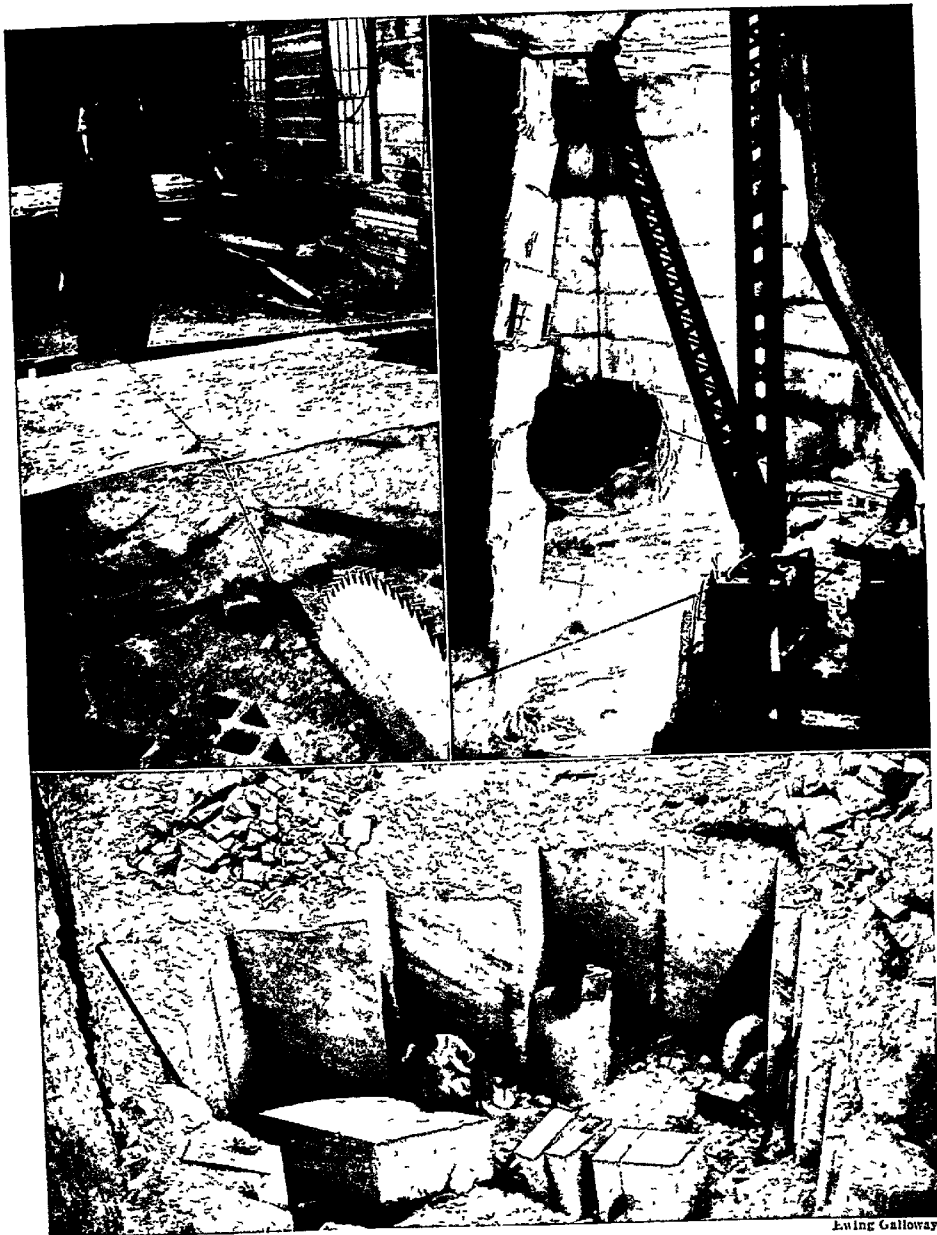
QUAPAW, *kwaht'paw*, Sioux Indian tribe, better known as the Arkansas, now consisting of a few hundred persons living upon a reservation in Oklahoma. The Quapaws were relatives of the Kaw, Ponca and Osage tribes. See **SIOUAN INDIANS**.

QUARANTINE, *kwaht'an teen*, a term now used to signify the isolation of persons, places, animals and effects likely to spread infectious disease, the period of quarantine depending upon the nature of the disease. Originally the term referred to the period of forty days during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, was forbidden intercourse with the place at which she arrived.

National Quarantine. By act of Congress passed in 1888 national quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot or owner of any vessel to enter a port in violation of the act or of regulations framed from time to time under it.

State and Municipal Quarantine. In most of the states and cities of all countries a house or a whole town may be quarantined and its inhabitants prevented from leaving. The laws are very strict, as is usual concerning homes containing cases of diphtheria, smallpox or scarlet fever. General government regulations provide for the protection of a country as a whole, each smaller division of which takes steps to defend itself individually against infectious diseases.

QUARRY AND QUARRYING. A quarry is an open excavation from which stone is taken for building and engineering purposes, and *quarrying* is the process of loosening and removing the stone.



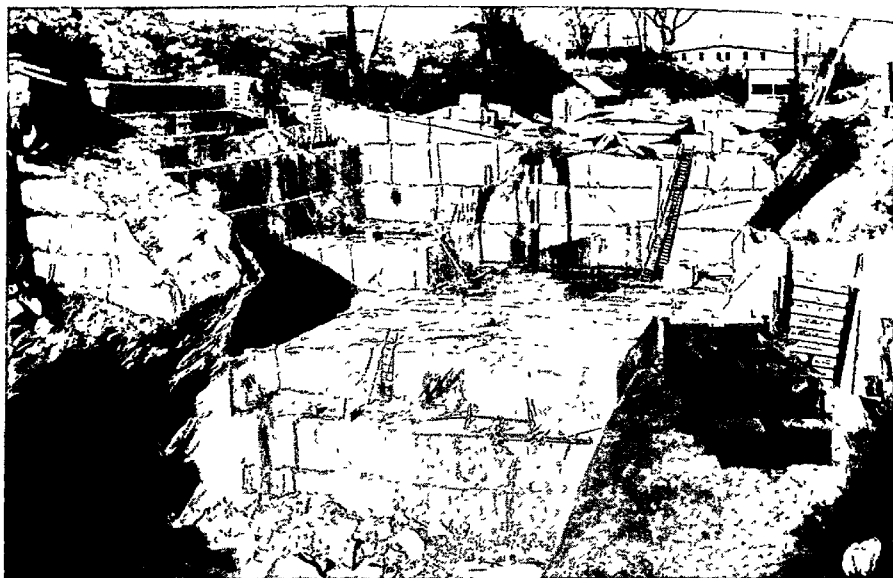
Keystone

Ewing Galloway

VIEWS IN THE QUARRYING INDUSTRY

Sawing a huge block of slate in a Pennsylvania quarry. Lifting a marble mass from underground in a quarry in Vermont. Below, in a Bermuda quarry is found a rock that is soft before quarrying, but becomes very hard under exposure to the sun, it is one kind of coral formation.

[See over]



Keystone

QUARRYING SCENES

Above, in quarry of the Green Mountain Company, Vermont Below, drilling holes with pneumatic tool in a solid mass of slate, in Pennsylvania. The men are 300 feet underground.

Quarrying. The objects to be attained in quarrying are to obtain the largest quantity of stone with the least waste and at the least expense. Three methods are in general use. They are known as the *plug and feather*, the *explosive* and the *channeling* methods. The method employed in any quarry depends upon the structure of the rock and the purposes for which it is to be used. All rocks are divided into two great classes, stratified and unstratified. Limestone and slate are good examples of stratified rock; granite and porphyry, of the unstratified. Stratified rock breaks more easily along the seams between layers than in any other direction, while the unstratified breaks about as readily in one direction as in another.

The Plug and Feather Method, used for centuries when it was desired to secure blocks of stone of a given size and shape. It consists in drilling a series of small holes (about three-fourths inch in diameter) and a few inches apart, along a line that has been marked on the ledge. Into each hole a plug or wedge and two "feathers" are placed, one on each side of the wedge. The feather is a piece of steel, flat on one side and round on the other. The plugs and feathers are then slowly driven into the holes, the workmen striking them in succession, so that the pressure will be uniform all along the line. The force exerted by the plugs splits the stone. This method was used with remarkable success by ancient peoples, and well into modern times.

The Channeling Method. This makes use of a machine which cuts narrow grooves or channels in the rock, and in this way separates the block from the parent ledge. Sometimes the process of *undercutting* or drilling a series of holes under the block to be separated, is used to assure a perfect block. Channeling is in general use in the large marble quarries, since marble is too soft to withstand the pressure from the plug and feather system.

The Explosive Method, a method used when the quarryman desires to loosen a large quantity of rock or to break the rock into small fragments. A number of deep holes are drilled into the rock and a charge of explosive is placed in each and connected with an electric battery. The nature and quantity of explosive depend upon the result desired, and a degree of skill gained only through long experience is necessary to enable the quarryman

to use just the right quantity. If the object is simply to loosen the stone in large blocks a slow explosive like gunpowder is employed. If, on the other hand, the purpose is to break the rock into small fragments, dynamite is employed.

Related Articles.	Consult the following
titles for additional information:	
Blasting	Granite
Building Stone	Limestone
Dynamite	Marble
Explosives	Sandstone

QUART, kwawrt, a measure of dry and liquid capacity in the English system of weights and measures. As a unit of dry capacity it contains 67.2 cubic inches, is divided into two pints and is approximately equivalent to 1.101 liters. As a unit of liquid measure it contains 57.75 cubic inches, is also divided into two pints and is approximately equivalent to 946.3 liters. See WEIGHTS AND MEASURES; METRIC SYSTEM.

QUARTER-DECK, that part of the upper deck of a ship lying between the stern and the mainmast, specifically in the days of sailing vessels. The forward part of the right side was reserved for the senior officer. The quarter-deck was saluted by all who stepped upon it, the officers present returning the salute. A sailor coming to the quarter-deck with a complaint always stood near the mast, at the forward end, and was said to "come to the mainmast." Because of its traditions the quarter-deck is a symbol of authority among seamen.

QUARTERMASTER, in the United States army a commissioned officer connected with the supply department. The quartermaster of a regiment usually has the rank of lieutenant. His duties are to superintend the assignment of quarters, fuel, clothing, food and other supplies, and to be guardian of his regiment's supplies when on the march. Navy quartermasters have less important duties and are usually petty officers. They are under command of deck officers and supervise certain daily routine aboard ship.

The Quartermaster's Department. This is a staff department of the army. It has charge of the purchase and distribution of the supplies of the entire army. The quartermaster-general, who is at the head of the department, is a member of the general staff.

QUARTZ, the most abundant mineral and forms a portion of nearly all rocks. Pure quartz looks like the best quality of glass, for which it might be easily mistaken. A quartz crystal has the form of a six-sided prism,

with a pyramid at the end. The prisms are so hard that one can easily write on glass with them. When colorless this form of quartz is called rock crystal, and it is used to some extent in making ornaments and lenses for spectacles. When colored, quartz crystals take different names (see PRECIOUS STONES).

The most common forms of quartz occur in rocks. They vary in color from milky white to black. Red and brown quartz rocks are called jasper. Sandstone is formed of grains of quartz cemented together by some other mineral. Quartz forms a good proportion of granite, and it can be easily detected by its resemblance to broken glass. When quartz is ground to a powder and heated with potash, lime or soda, it melts and forms glass. The waters of many hot springs dissolve quartz, and when they cool, it forms in beautiful crystals around the edges of the springs. Some of the celebrated springs in Yellowstone Park are ornamented in this way.

QUARTZITE, a metamorphic rock, named from the mineral quartz (see above), because that is its principal constituent. In its composition the quartz is alternated with sandstone. There are also frequent other ingredients, such as mica and feldspar. See METAMORPHIC ROCKS.

QUARTZ VEIN, a rock fissure filled with quartz, most frequently of igneous origin (formed by fire) but sometimes a hardened solution formed by precipitation.

QUASSIA, *kwosh'e a*, or **BITTER ASH**, a genus of South American tropical plants, which includes both trees and shrubs. The tree of one species grows to a height of twelve feet and bears long clusters of red blossoms. The wood, which is exceedingly bitter, is shunned by insects and is therefore much used in cabinet making. The root, which also is bitter, was formerly used as a cheap substitute for hops to give a bitter flavor to beer.

QUATERNARY, *kwah tur'na ry*, **PERIOD**, a term formerly applied to that division of the Cenozoic Era following the Tertiary Period and including the subdivisions called, respectively, Glacial and Recent.

QUATRAIN, *kwot'rane*, from a French word meaning *four*, is a rhymed poem of stanzas of four lines each. The most famous quatrain of the present day is the Fitzgerald translation of *Omar Khayyam*. Many epigrams, proverbs, epitaphs, etc., are also in this form.



Church at
St. Anne de Beauséjour

QUEBEC, *kwe bek'*, the oldest and largest province of the Dominion of Canada, is bounded on the south by Ontario, New York, the Northern New England states, New Brunswick and Chaleur Bay; on the east by the Atlantic Ocean and Labrador, on the north by Hudson Strait and Ungava Bay, and on the west by Hudson Bay, James Bay and Ontario. Its greatest extent from east to west is about 1,000 miles, and from north to

south the distance is about the same. The most easterly point is 500 miles farther east than Porto Rico, and its western boundary has practically the longitude of the western boundary of New York. The area is 594,434 square miles, of which 71,000 square miles are fresh water. Quebec is more than double the size of Texas, and a little less than three times that of France.

The People. The province was originally settled by the French, and the descendants of these colonists constitute more than three-fourths of the population. They have maintained not only the language, but many of the institutions and customs, of their ancestors, so that the Province of Quebec is more completely non-English speaking than any other portion of the Dominion. In the construction of their dwellings and in their social life, the French Canadians form a class by themselves. In general they are industrious, frugal and prosperous. Notwithstanding the fact that thousands of them have emigrated to the New England states, the province increased over twenty per cent in population between 1921 and 1931, the date of the last census, when the population was 2,874,255. In 1921 it was 2,360,665.

French is the language generally spoken, except in Montreal, where about one-fourth of the population are English-speaking, and in a small area bordering on the New England states, known as the Eastern Townships. The inhabitants of this section are of English descent, and in customs and language resemble closely the people of New England.

About six-sevenths of the people are communicants of the Roman Catholic Church,

and the country contains a number of noted cathedrals, churches and shrines. Not the least famous among them is the old church of Ste Anne de Beaupré, where, so it is said, thousands have been healed of various diseases. The other denominations, in order of their membership and importance, are the Anglican (Episcopal), United Church and Lutheran. There are 60,000 Jews.

Surface and Drainage. The land along the Saint Lawrence River and between the Saint Lawrence and Richelieu is low and level, but with this exception that portion of the province south of the Saint Lawrence is traversed by the Notre Dame Mountains, which are an extension of the Green Mountains and follow the course of the river in a northeasterly direction to Gaspé Peninsula. These mountains are really a low plateau, but here and there are a few prominent peaks, among which Black Mountain, Beloeil, near the Richelieu River, and Sutton Mountain, farther east, are the most prominent. Mount Royal, near Montreal, is also very conspicuous. North of the Saint Lawrence is the Laurentian Plateau, consisting very largely of a rocky, undulating surface, with but little good soil, though a large portion of the region is quite heavily timbered. This plateau is traversed by the Height of Land, which separates the rivers flowing into the Atlantic from those flowing into the Hudson Bay. In the western part of the province this reaches an altitude of 1,000 feet, but it gradually rises toward the east, until, along the northern banks of the Saint Lawrence, bluffs ranging from 1,500 to 1,900 feet are found.

The Saint Lawrence and its tributaries drain nearly all of the province, and to the influence of this magnificent river Quebec owes very much of its development and prosperity. The chief tributaries of the Saint Lawrence from the north are the Ottawa, forming a part of the southern boundary; the Saint Maurice, remarkable for its volume of water and its falls; the Montmorency, with celebrated cascades, and the Saguenay, famous for the grandeur of its scenery. The Gatineau, noted for lumbering operations, is an important tributary of the Ottawa. The important tributaries from the South are the Richelieu, which drains Lake Champlain; the Chaudière, noted for beautiful falls, and the Saint Francis, which is valuable for water power.

The region north of the Height of Land is drained into Hudson Bay and the Atlantic Ocean. Grand Falls, on the Hamilton River, is a cataract that in many respects rivals Niagara. The main fall is 200 feet wide and 310 feet high. Were this water fall easily accessible it would be visited by thousands of tourists every year.

There are numerous lakes, most of them north of the Saint Lawrence. Lake Mégantic, north of Maine, is a favorite resort of fishermen; Memphremagog, with its southern end in Vermont, is widely known for its beautiful scenery, and Lake Saint John, 150 miles north of Quebec, is a popular resort.

Climate. Quebec has a cool temperate climate. The winters are long and severe, extending from November to April, and during the coldest weather the thermometer is liable to reach 30° below zero. The summers are warm, but not excessively hot. In general, the air is dry and bracing, and the climate is remarkably healthful. The rainfall is ample for agricultural purposes, and a large portion of the province is covered by deep snow during the winter.

Minerals and Mines. Quebec's mineral resources are only partially developed. The province supplies about eighty per cent of the world's output of asbestos. The mines are located in the Eastern Townships, chiefly in Thetford and Asbestos. Within recent years the mining of gold and copper, hitherto of secondary importance, has reached very large proportions, gold yields the greater returns in dollars, but copper is a close second, about equal to the value of the asbestos. The values of the three run yearly from \$5,000,000 to \$8,000,000 each. Graphite, feldspar, manganese, mica, and silver, yield well, and much cement is manufactured.

Fisheries. A large number of the people living on the shores of the Gulf of Saint Lawrence are engaged in fishing, and the total value of the fisheries is about \$2,000,000 yearly. Cod, herring and salmon, in the order named, yield the largest revenue. Lobsters, mackerel and other fish are also taken in large numbers. The industry gives employment to about 10,000 men.

Agriculture. Agriculture is the leading industry, and more than one-half the occupied land is under tillage. However, this is but a small part of the tillable land in the province. The most fertile lands are in the river valleys and in that part of the

province south of the Saint Lawrence, where the land is all occupied. North of the Saint Lawrence there are large areas of fertile land, but they are separated by rocky tracts. The leading crops are hay, oats, barley, potatoes,

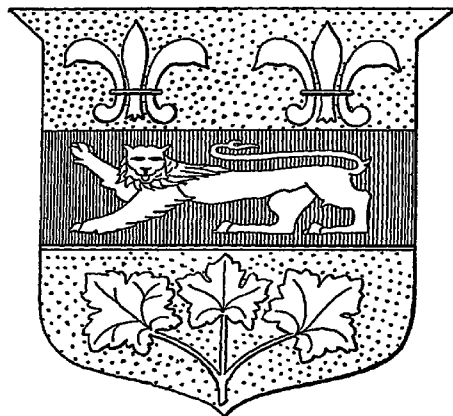
is in this region that the great lumber interests are located; 5,000,000 acres of the surveyed forests are under private ownership, and 45,000,000 are licensed to lumbermen, the balance remaining under control of the government. Spruce, pine, hemlock, balsam and tamarack among the soft woods, and oak, beech, birch and maple among the hard woods, are used extensively.

Lumbering is one of the leading industries of the province, and is carried on chiefly around the sources of the Ottawa, the Gatineau, the Saint Maurice and a few other streams north of the Saint Lawrence. Most of the lumber is worked up in mills on the rivers, but some of it is made into rafts that are towed long distances by steamers. Lumber of all dimensions, including shingles and lath, is made in large quantities. Large quantities of spruce are made into pulp for paper.

Quebec has about 174,000 square miles of forest preserves. The annual value of the timber cut is about \$10,000,000 and of the wood pulp about \$30,000,000.

Manufactures. Quebec is the second province in the Dominion in the extent and value of its manufactures. Nearly every stream is a source of water power, and sawmills, gristmills and small factories are generally distributed over the older parts of the province. The manufacture of lumber, pulpwood, and lumber products are leading industries; on the larger streams are numerous plants for the development of electric power. In Montreal, Quebec and Saint Hyacinthe are large boot and shoe factories. The leading ironworks are at Montreal, Three Rivers and Sherbrooke. These cities and Valleyfield also are the site of the largest cotton and woolen mills. The annual value of the manufactures is not far from \$670,000,000.

Transportation and Commerce. The Saint Lawrence is navigable for large ocean steamers as far as Montreal and furnishes ample water transportation for the interior, as well as for the towns along its banks. The Canadian National and Canadian Pacific railways and subsidiaries are in the section south of the Saint Lawrence, so all counties and nearly all townships in this region have ready access to the railway. They also have important lines extending from Quebec to Montreal, the two important cities, and westward on the north side of the Saint Lawrence.



COAT OF ARMS OF QUEBEC

Two fleur de lis, in blue, on a gold background, symbolize the days of French rule in Quebec. The British lion, on a red field, is the symbol of unity with the Empire. Below is a sprig of green maple leaves on a gold background, the maple leaf being used as the nation's emblem of Canada.

peas, buckwheat, vegetables and tobacco, the last named is grown in the counties immediately around Montreal and on the north shore of the Saint Lawrence. Apples and plums of excellent quality are raised in the Eastern Townships, and small fruits are successfully grown. This section is also well suited to dairy husbandry, and large quantities of butter, cheese and condensed milk are made. The annual dairy output of the province amounts to over \$45,000,000. The raising of live stock is an extensive branch of industry, and good breeds of horses, cattle, swine and sheep are an important source of revenue to the farmers. Bees are kept in the more favorable localities, and the provincial Department of Agriculture is extending the poultry industry by sending to the children in the rural schools settings of eggs each year that they may receive training in the care of poultry.

Forests and Lumber. Over 130,000,000 acres of forests have been surveyed, and in addition to this vast area are the unexplored forests of Ungava. These great forest areas are all north of the Saint Lawrence, and it

Items of Interest on Quebec

The area of Quebec after 1912 was 706,834 square miles until 1927, when a part of Labrador (111,300 square miles) was awarded to Newfoundland. Present area, 594,434 square miles.

There are three main physical divisions: (1) the Laurentian highlands, really a plateau; (2) the valley of the St. Lawrence; (3) the Notre Dame Mountains and the rolling country to the southeast of this range.

The highest point in southern Quebec is Mount Logan, in Matane county, 3,708 feet; the highest point in the Ungava district is Nachvak Mountain, about 6,000 feet.

Some of the rivers draining the plateau run in deep, high-walled valleys cut in solid rock, such as those of the Hamilton, Mingan and Saguenay rivers. The walls between which the Saguenay flows in some places reach a height of 1,500 to 1,800 feet.

In the province of Quebec there are approximately 500,000 milch cows, 600 creameries, 500 cheese factories and 250 combined factories (making butter and cheese). The average production of butter is valued at \$16,000,000; the total output of cheese worth not far from \$2,000,000.

The hay and clover crops have an average annual value of about \$40,000,000.

The annual output of maple sugar is about 4,300,000 pounds, which is over two-thirds of the output of the Dominion.

The developed waterpower of Quebec is about 3,700,000 horsepower.

The island of Anticosti, in the Gulf of St. Lawrence, now used as a game preserve, is 135 miles long by 40 miles wide.

Flax is cultivated in small quantities chiefly for its fiber, it is manufactured into fabrics almost exclusively by hand.

The growing of tobacco for commercial purposes is confined to the district around Montreal, the average production of Quebec is about 6,000,000 pounds, the total production of the Dominion being about 40,000,000 pounds.

Quebec ranks second in the total value of

manufactured commodities, with nearly \$700,000,000 a year.

It leads the Dominion in the production of paper, and in the manufacture of tobacco products.

Quebec leads the world in the production of asbestos, the annual product being valued at about \$5,000,000. Thetford, in Megantic county, is the center of this industry.

The mineral products of the province are more than \$30,000,000 in value.

Ninety per cent of the inhabitants over five years of age can read and write.

Questions on Quebec

What is the present area of Quebec? When was the boundary changed?

What is the length of the province from east to west?

What are the three main physical divisions?

Name some of the principal rivers.

What and where is Anticosti?

What is the principal crop?

Name four other large crops.

What fruits are raised in Quebec? For what fruit is the Montreal district famous?

What is the relative importance of the dairy industry?

What are the principal products of the fisheries?

What is the approximate forest area?

Name four leading manufactures?

What are the principal mineral products?

What are the leading educational institutions?

Name five of the large cities.

Which is further east, Porto Rico or Quebec?

How much larger is Quebec than was the German Empire under the rule of William II?

What is Quebec's greatest waterfall? Why is it not more widely known?

If the mines at Thetford and Asbestos should stop operating what industries would be affected?

Numerous short lines are found in those regions where industries warrant their construction, and a branch has been extended northward to Lake Saint John.

The commerce of the province is considerable, the exports consisting of lumber, stock and dairy products and some manufactures, while the imports consist of manufactured goods. Most of the foreign trade is with Great Britain and the United States. Montreal and Quebec are the chief commercial centers, and Montreal, the meeting place of inland and ocean traffic, has become the great commercial center of the Dominion. From this port large quantities of wheat grown in the northwestern provinces are shipped to Europe.

Government. The chief executive is a lieutenant-governor, appointed by the Governor-General of the Dominion, with the advice of his Council. The lieutenant-governor is assisted by a council. The legislature consists of a council of twenty-four members, appointed for life, and an assembly of ninety members, who are chosen by popular vote. The administration of justice in Quebec differs somewhat from that in other Canadian provinces, since the French civil law obtains in the lower courts, this privilege having been granted the early inhabitants, who were mostly French, when Quebec became British territory.

Education. The public schools are under the administration of a superintendent of instruction, but a dual system is maintained, both the Catholics and Protestants having charge of schools of their respective faiths and having a right to prescribe certain religious instruction. Two provincial school committees are maintained, one being Catholic and the other Protestant. The management of the schools rests with local boards. The province maintains thirty normal schools, and there are a number of colleges and secondary schools under religious denominations. The most noted among the higher schools are Laval University at Quebec and the University of Montreal, Catholic institutions, and McGill University at Montreal, non-denominational, and the most widely known.

Cities. The chief cities are Quebec, the capital, Montreal, Saint Hyacinthe, Hull, Sherbrooke, Westmount, Outremont, and Verdun.

History. Cartier was the first white man to visit the province. In 1608 Champlain

made the first settlement by founding a colony at Quebec. Seven years later the Recollet and Jesuit missionaries began their work among the Indians and explored a large part of the province. However, for a long time but few permanent settlements were made, those coming to the country from France being devoted to trading with the Indians and to exploring the wilds of the forests. Indian wars undoubtedly had much to do with preventing settlements during this period. After several changes, the Province of Quebec finally became a British province in 1763. Soon after, the region was divided into two provinces, Quebec being known as Lower Canada, or Canada East, and Ontario as Upper Canada, or Canada West. The provinces, however, were reunited in 1841 and remained under one colonial government until the formation of the Dominion, in 1867, when Ontario again became independent, both provinces joining the federation.

Related Articles. Consult the following titles for additional information.

CITIES AND TOWNS

Chicoutimi	Saint Hyacinthe
Hull	Saint Johns
Lachine	Sherbrooke
Levis	Sorel
Montreal	Thetford Mines
Quebec	Three Rivers
Saint Anne de Beaupré	Valleyfield

RIVERS

Chaudière	Saguenay
Memphremagog	Saint Lawrence
Ottawa	

UNCLASSIFIED

Anticosti	Quebec Act
Champlain, Samuel	Quebec Resolutions
Laurentian Mountains	Quebec Tercentenary

QUEBEC, BATTLE OF, one of the most important military engagements in American history, waged on the Plains of Abraham, behind the city of Quebec, on September 13, 1759. To bring about the final overthrow of the French in America and end the French and Indian War, Great Britain directed an offensive against the principal French strongholds, Montreal and Quebec. In June, 1759, General Wolfe, with an army of 8,600 men, sailed up the Saint Lawrence and landed on the southern bank of the river. Quebec, on the opposite side, occupying an almost impregnable position on a high bluff, was defended for several miles by French guns.

Realizing that the city could not be taken by direct assault, Wolfe planned one of the most daring projects ever conceived by a military leader—to scale the heights under

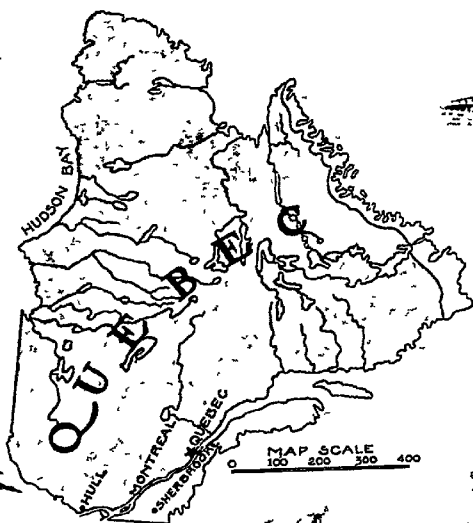
QUEBEC



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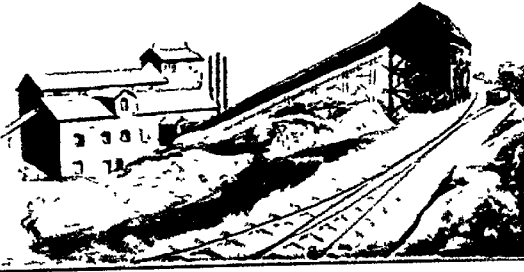
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1. Citadel of Quebec
2. Montmorency Falls

3. Victoria Bridge, Montreal
4. Tobacco Plant

5. Apples
6. Cathedral of Notre Dame, Montreal

7. Lumbering
8. Asbestos Mill

cover of darkness and attack Montcalm, the French commander, from the rear. After the most careful preparations, on a night when there was no moon, the British rowed silently to a point above the fort, where a narrow pass, the bed of a dried up stream, led to the plain above. Throughout the night, in single file the British soldiers made their way up, and when day dawned the whole army numbered 4,829 men, of whom 3,111 took part in repulsing Montcalm's attack. After a brief engagement Quebec fell. Both commanders were killed.

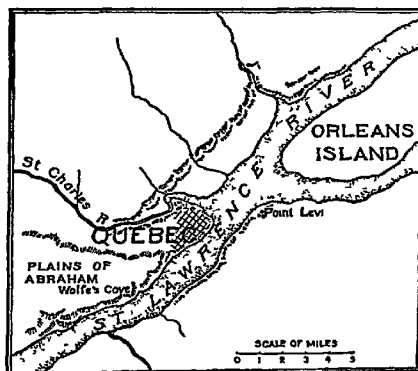
With the fall of Quebec, French power in America came to an end, and by the Treaty of Paris, in 1763, the whole of Canada was ceded to Great Britain. The site of the battle is now a part of the Battlefields National Park. See PARKS, NATIONAL.

QUEBEC, CITY OF. It is related in the early history of New France that when Jacques Cartier (which see) sailed up the Saint Lawrence River in 1535, as he passed a large island he beheld a bold promontory projecting from the north bank of the river. Surprised at the sudden appearance of the bluff, which rises to the height of 333 feet, the explorer exclaimed "Quel bec!" (meaning "What a beak"), and from this incident it is said the bluff and the city built around and upon it took the name Quebec.

Sometimes called the "Gibraltar of America," and sometimes the "Cradle of New France," Quebec, the capital of the province of Quebec, is the oldest city of Canada. It is built around and upon the promontory known as Cape Diamond, formed by the confluence of the Saint Charles River with the Saint Lawrence. It is 170 miles northeast of Montreal, 780 miles southwest of the Strait of Belle Isle, and 430 miles northeast of New York. When Cartier discovered the promontory, the Indian town of Stadacona was clustered about the foot of the bluff. Cartier took possession of the place in the name of the king of France, but no attempt at settlement was made until 1608, when Samuel Champlain (which see) began a settlement that was destined to become the center of French activities in America.

General Description. The city is divided into the upper and the lower towns. The lower town is built along the river banks, at the foot of the bluff, and contains the wholesale district, the wharves, the railway depots and the principal business establishments.

The upper town is built upon a terrace and on the top of the bluff and is from 100 to 300 feet higher than the lower town. The two parts of the city are connected by steep, narrow streets and by flights of steps, some of which have been cut in the rock. The upper town is devoted to residences, hotels, churches, convents and retail establishments. A portion of this part of the city is enclosed by a high wall, which extends around the point of the bluff and was formerly entered through a number of gates, though all but two of these have been removed. In general, the streets are narrow and irregular, except in the more level parts of the upper town, where the city is regularly laid out. The



QUEBEC AND VICINITY

highest point of the bluff, known as Cape Diamond, is occupied by the citadel, which encloses an area of about 40 acres and is usually occupied by a garrison of Canadian militia. The remarkable strength of this fortress during the French and Indian Wars gave Quebec the name *Gibraltar of America*, but the fortifications would afford little resistance to a modern warship. To the south of the citadel are the Plains of Abraham, on which was fought the battle that resulted in transferring all the French dominions in America to the British (see QUEBEC, BATTLE OF). The battlefield is now a national park. At the foot of the citadel and extending a little to the north, occupying a terrace about a quarter of a mile long, is Dufferin Terrace, a celebrated promenade 200 feet above the river, from which one of the finest views of the city and the surrounding country can be obtained. Back of this terrace is the governor's garden, in which there is a monument to Wolfe and Montcalm.

Quebec more closely resembles an old European town than any other American city. Many of the older buildings are constructed of cobblestones, held together by mortar, and nearly all are of a gray limestone found in the vicinity. In many cases the roofs are still covered with tin, and the style of architecture is that of the French cities of the days of Louis XVI. These features, combined with its narrow, winding streets, give the city a quaint and interesting appearance.

Public Buildings. Among the most important public buildings are the houses of parliament and departmental buildings of the provincial government, the postoffice, the customhouse, the city hall, the armory and the exhibition building, the courthouse and a number of business blocks and banks. Among the churches, the Basilica, the Catholic cathedral, situated on one side of Baude Street, in the upper town, is of first interest. It seats an audience of about 4,000 and contains a number of paintings by Van Dyck, Carracci, Hallé and other distinguished painters. Nearby are the buildings of Laval University, the chief Catholic college of Canada, noted for its museum of Indian antiquities (see LAVAL UNIVERSITY). The English Cathedral, the United Church of Canada and St. Andrew's Presbyterian Church are also worthy of mention. Quebec contains a number of large convents. Among these, the Ursuline Convent is celebrated for its large building and beautiful grounds. It is also of historic interest, because within the building are the remains of Montcalm. Hotel Dieu is also worthy of mention, because of the large hospital connected with it. At the lower end of Dufferin Terrace is Chateau Frontenac, Quebec's leading hotel.

Other Points of Interest. Six miles east of the city are the Falls of Montmorency, formed by the Montmorency River, where it plunges over the bluff to reach the Saint Lawrence. This little cascade is 275 feet high and is famous for its beauty. Across the river, near Levis, are the Chaudière Falls, 350 feet wide and 150 feet high. Another object of interest is the great cantilever bridge, the largest of its kind in the world, connecting Quebec with Levis, on the opposite bank of the Saint Lawrence. This bridge was completed in December, 1917 (see BRIDGE). The shipping of lumber and the manufacture of textiles, boots and shoes are the leading industries.

History. The discovery of the site of the city is told in the opening paragraph. The first settlement was made by Champlain in 1608. The city was captured by the English in 1629 and was restored to the French three years later. In 1690 the New England colonists made an expedition against it, but failed. Another similar expedition which also resulted in failure occurred in 1711. During the French and Indian Wars it was an important military post and the center of French activities. It fell into the hands of the English in 1759, and the result of the capture was confirmed by the Treaty of Paris four years later. Quebec was the capital of Canada until 1858, when the capital was transferred to Ottawa. The city has grown slowly, yet it is an important shipping point. The largest ocean-ships visit the city, where they exchange cargoes with river boats. The Canadian Pacific, the Canadian National, and a number of shorter lines of railway connect Quebec with the important cities of the Dominion and with the United States. Population, 1921, 95,193; 1931, 130,594.

QUEBEC ACT, an act passed by the British Parliament in 1774 to provide for a government for the province of Canada, which had been acquired from France eleven years previously (see QUEBEC). By this act the boundaries of Quebec province were extended to include all the North West Territory; French civil law was substituted for English and an appointive legislative council was established, by means of which representative government was withheld from the people. The extension of Quebec provoked the indignation of the thirteen English colonies, for it meant encroachment upon land included in their original charter. It was one of the causes that led to revolt in 1775.

QUEBEC BRIDGE. See QUEBEC, CITY OF; BRIDGE, page 556

QUEBEC RESOLUTIONS, the document which made Confederation in Canada possible. It was drawn up in October, 1864, by representatives from the various provinces who met in Quebec under the leadership of Sir John A. Macdonald. These representatives drew up the set of resolutions embracing the conditions upon which federal union might be possible. They were adopted by the legislatures, and in the form of a series of addresses were presented to Queen Victoria. They formed the nucleus for the British North America Act, which estab-

lished the Dominion of Canada. See **BRITISH NORTH AMERICA ACT**.

QUEBEC TERCENTENARY, *ter cen'te-nari*. The city of Quebec was founded by Samuel de Champlain in 1608. A celebration in honor of the three-hundredth anniversary of the event took place there in 1908, beginning July 23 and continuing two weeks. Pageants were enacted illustrating many important events in Canadian history. British warships and naval craft from the United States, France, Germany, Spain, Italy, Japan and Argentina participated. The Prince of Wales, later King George V, was present. The United States was officially represented by Vice-President Fairbanks.

QUEEN, a female sovereign, *queen regnant* if she is supreme ruler; *queen consort* if she is queen only by virtue of the fact that she is the wife of a reigning king. The mother of a king is known as the *queen mother*, and the widow of a king as *queen dowager*. A queen who holds the throne in her own right has the same duties and obligations and the same political status as king; a queen consort, while the first woman of the realm, is legally the king's subject.

QUEEN ANNE'S WAR. See **FRENCH AND INDIAN WARS**.

QUEEN CHARLOTTE, *shahr'lot*, **ISLANDS**, a group of islands of volcanic origin off the coast of British Columbia, and forming, politically, a part of that province. The islands, of which the largest are Graham and Moresby, have a total area of 5,100 square miles. They are inhabited chiefly by Indians of the Haida tribe, a highly-enlightened people, who here number 700. All the islands are covered with magnificent forests; gold-bearing quartz of rich quality has been found, and copper and iron ores and a fine vein of anthracite coal are among the resources. There are good harbors, and fishing is an important industry.

QUEENSBERRY, **JOHN SHOLTO DOUGLAS**, Eighth Marquis of (1844-1900), a famous English patron of sports. He succeeded to his father's titles and estates in 1858, served five years in the army, and from 1872 to 1880 represented Scotland in the House of Lords. He was one of the founders of the Amateur Athletic Club and helped to formulate the rules for prize fighting known as Queensberry rules. See **BOXING**.

QUEENSLAND, a state of the Commonwealth of Australia, comprising the entire

northeastern part of the continent. Its extreme length from north to south is 1,200 miles, its greatest breadth is 940 miles, and its area is 670,500 square miles, or about one-fifth that of the United States. The coast line is 2,250 miles in extent. The coast is skirted by numerous islands, and beyond these lies the Great Barrier Reef, a coral ridge over 1,200 miles in extent and enclosing a long, narrow body of quiet water, having many fine harbors.

The wedge-shaped northern extremity known as York peninsula partially encloses the Gulf of Carpentaria. Toward the west a large portion of the surface is dry and barren, but toward the east, and for a long stretch along the coast, boundless plains, or downs, admirably adapted for sheep walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The highest mountains are near the coast, the greatest elevation being about 5,400 feet. Queensland has a large number of rivers, several of which are navigable for long distances and are convenient outlets for the produce of adjacent districts.

The climate is healthful, and the temperature is comparatively equable. The mean temperature at Brisbane is 69°, and in the hottest parts of the state the temperature seldom rises above 97°. The rainfall in the interior is scanty and variable; the mean fall at Brisbane is about 50 inches, and in the northern coast districts it sometimes reaches 150 inches. Here it is of little value for agricultural purposes.

The People. About one-fifth of the inhabitants are of British descent, and about one-fourth are full-blood or half-blood Asiatics, including Polynesians. Most of the remainder consist of native Australians, many of whom are living in a civilized state. There is also a sprinkling of Germans, Danes and Scandinavians. From 1927 to 1933 the population showed a steady growth, from 875,187 to 949,286, exclusive of natives. Brisbane (which see), the capital and largest city, has about 334,000 inhabitants. The other cities having 20,000 or more inhabitants are Ipswich, 26,000, Townsville, 31,000, Toowoomba, 27,000, and Rockhampton, 30,000.

There is no state Church. The leading religious denominations are Anglican (Episcopal), Roman Catholic, Presbyterian, Methodist, Lutheran and Baptist.

Primary education is free and compulsory, and the percentage of illiteracy is very low. Separate schools are maintained for boys and girls. In addition to the grammar and high schools there are fourteen technical schools. The University of Queensland, established at Brisbane in 1911, is rapidly increasing in numbers of students and in influence.

Industries. Agriculture and the raising of live stock are the principal occupations. In the eastern section the land is suitable for cultivation, and large crops of cotton, cane, hay, wheat, corn and potatoes are grown. Among the fruits bananas, oranges and pineapples are plentiful. The more arid lands in the west are devoted to grazing and large numbers of sheep and cattle are raised. In some sections dairying is important.

There are rich stores of gold, silver, copper, tin and bismuth in the mountains. The state also contains extensive coal measures, and will in the near future, become an important producer of coal. The principal manufactures are sugar mills, steam sawmills, soap works, agricultural implement works and distilleries. There are about 6,600 miles of railway in operation, as well as efficient telegraph and telephone systems. The chief exports are sugar, gold, wool, meat and hides

Government. The executive department of the government is vested in a governor appointed by the Crown. The power of making laws and imposing taxes is vested in a parliament, the Legislative Assembly, which comprises sixty-two members, elected for three years by ballot, from seventy-two electoral districts. Both men and women vote on equal terms.

History. The first settlement of Queensland took place in 1826, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales and was organized as a separate colony in 1859. In 1899 the colony accepted the constitution of the Australian Commonwealth.

QUEENSTOWN, IRELAND, renamed COBH by the Irish Free State, on Cork harbor, on the Atlantic coast, is an important port of call for steamers to and from the United States, and a resort that attracts visitors because of the beauty of its location. The streets rise above one another in the form of an amphitheater. There is little trade and in-

dustry; the main support of the people is derived from maritime activities. Population, about 7,000.

QUETZAL, *kwet'sawl*, a beautiful tropical bird of the trogon family, native to Central America, India and Africa. It is about the size of the magpie. The back, head, crest and fluffy throat and chest are bright emerald; the lower parts are brilliant scarlet. The feet are small, and are useless for walking. The male is more brilliantly colored than the female and has handsome upper tail coverts about three and a half feet long. These birds live in the heart of the forest and feed on wild fruits, lizards, worms and insects. The eggs are laid in decaying stumps.



QUETZAL

QUEZON, *ka'zohn*, **MANUEL LUIS** (1878-), a statesman of the Philippine Islands, and first President of the new republic established in 1935 under authority of the Congress of the United States. He was born and educated in the islands. During the Spanish-American War, when Aguinaldo was resisting American occupation of the Philippines, he was a youthful lieutenant of the latter. When pacification followed, he was admitted to the bar (1903), became a prosecuting attorney, then a provincial governor, resigning the latter post to become a member of the Assembly. There he rose to influential heights. His political faction sent him as commissioner to the United States in 1909, and he remained in Washington until 1916. Returning home, he was chosen president of the Filipino Senate, resigning after long tenure to accept the Presidency of the republic. It was due largely to his efforts that independence was granted to the islands.

QUICKSAND, a deep mass of water-soaked sand, so loose and soft that it cannot be walked upon. Quicksands are formed on many sea coasts, and sometimes at the mouths of rivers. They look like damp, hard sand, and their fluid quality is not suspected by

persons unfamiliar with their treacherous character. Many an unwary traveler in a strange region has been engulfed in quicksand in trying to make his way across it, and has gradually sunk into it to his death. Where it is necessary to conduct engineering operations in quicksand areas, pipes filled with brine are sunk into the sand and the surrounding mass is hardened by freezing; sometimes, too, caissons are used to overcome the difficulty. See CAISSON.

QUICKSILVER. See MERCURY.

QUILLER-COUCH, *kooch*, ARTHUR THOMAS, SIR (1863-), an English author, born in Cornwall, and educated at Clifton College, and at Trinity College, Oxford, where he later became a lecturer in the classics. In 1887 he went to London, where for many years he was an editor of *The Speaker*. In 1891 he settled in his native Cornwall, a country which figures so charmingly in his novels and romances *Troy Town*, *The Splendid Spur*, *The Delectable Duchy* and *From a Cornish Window* are perhaps the best known of his thirty-five volumes. Besides novels, he has written numerous essays. In 1921 appeared *The Art of Reading*.

QUINCE, *kwints*, a small tree of the rose family, with leaf, flower and fruit closely resembling the apple and pear. It is a native of the island of Crete, but is cultivated throughout Europe and in America. The fruit is unfit to eat unless cooked. The tree is hardy and is cultivated throughout the South and as far north as New York state, where there are extensive orchards.

QUINCY, *kwim'si*, ILL., the county seat of Adams County, 265 miles southwest of Chicago, on the Mississippi River and on the Chicago, Burlington & Quincy, the Wabash, the Hannibal & Saint Joseph, the Saint Louis, Keokuk & Northwestern and the Quincy, Omaha, & Kansas City railroads. The Municipal Airport is two miles from the business center. There is steamboat service on the river. The industrial establishments include stove foundries, machine shops, show-case works, and manufacturing of air compressors, shoes, optical goods, brick, flour, wagons, agricultural implements, engines and various other articles. The city has an elevated location on a bluff 120 feet above the river. It contains a senior high school, Notre Dame Academy, Quincy College, a business college, Quincy Memorial Sanatorium, and Adams County Tuberculosis Sanatorium. Other in-

stitutions are the state soldiers' and sailors' home, Saint Mary's and Blessing hospitals, several homes for orphans and the aged, and the Quincy Historical Society. A Federal building, a courthouse, a Masonic Temple, a state armory, a library, the Chamber of Commerce, and a city hall are prominent structures. There are eleven parks, covering more than 150 acres, and a municipal golf course. Quincy was settled in 1822 and was chartered as a city in 1839. Population, 1930, 39,241.

QUINCY, JOSIAH (1772-1864), an American lawyer and orator, born in Boston, of prominent Revolutionary ancestry. He was educated at Harvard and admitted to the bar, after which he took an active interest in politics. As an extreme Federalist he became a member of the Massachusetts legislature in 1804, and the following year was elected to Congress. He vigorously opposed the administrations of Jefferson and Madison and particularly denounced the purchase of Louisiana, declaring it a just excuse for a division of the Union, and later opposed the War of 1812. In that year he retired from Congress, devoted himself thereafter chiefly to agriculture. However, he was subsequently elected to the Massachusetts house of representatives and later became mayor of Boston. In 1829 he became president of Harvard College, where he served with distinction until 1845. He wrote *History of Harvard University and Life of John Quincy Adams*.

QUINCY, MASS., a city in Norfolk County, on Quincy Bay, adjoining Boston on the south, on the Town River and on the New York, New Haven & Hartford railroad. There is an airport and a landing field. It is primarily a residence place, but has granite quarries, also a shipbuilding plant and machine shops. The city has nearly 3,600 acres of public parks and playgrounds. It contains the Eastern Nazareth College, the Crane Public Library, a city hospital. The place was settled in 1625 as Mount Wollaston. It remained a part of Braintree until its incorporation in 1792, when it was named in honor of John Quincy. It was the birthplace of John Adams, John Quincy Adams and John Hancock. Population, 1930, 71,983, in 1935, 76,909 (state census). It is an important part of the Boston metropolitan area.

QUININE, *kwi'nine*, or *kwi-need'*, a white crystalline substance, noxious, very bitter and possessing the power to allay fevers. It is the only remedy known for curing malaria.

(which see). The drug is obtained from the bark of several trees of the cinchona family. In small doses it is a tonic; in large doses it causes extreme disturbance of the nerves, headache, deafness, blindness and paralysis, and in rare cases, death. In all cases quinine should be taken only on the advice of a reliable physician.

QUINSY, *quinsy*, an inflammation of the membranes of the tonsils, often followed by the formation of ulcers which are difficult to heal. The disease usually begins with a chill, which is followed by fever and by severe pain and swelling of the tonsils. Sometimes the pain is intense and the swelling is so great that the jaws can scarcely be moved, and a general fever and even delirium may result, but the disease is rarely fatal. It does not seem to affect either children or old people. A light attack can usually be cured by rest in bed, the administration of a laxative, gargling and a dose of quinine. Severe cases need the attention of a physician.

QUINTILIAN, or **MARCUS FABRUS QUINTILIANUS**, (about A. D. 35-about 97), a Roman rhetorician, born in Spain. He probably went to Rome in his youth and, except for occasional sojourns in Spain, spent the rest of his life there. He practiced as an advocate and was very successful, but his chief claim to celebrity lay in his extraordinary ability as a teacher of eloquence. He taught twenty years, occupying a liberally-endowed chair of rhetoric created for him by Vespasian. He believed that training for oratory should begin in infancy and include a broad education. His ideas on education were incorporated in his *Institutio Oratorio*, a work remarkably sound in its judgments and broad in its treatment of rhetoric. It is not known whether any of his work survives. The 164 extant discourses attributed to him are probably the work of another.

QUIRINAL, *kwir'in al*, one of the hills on which Rome is built. It was named for the war god Quirinus, and in ancient times was the site of a temple in honor of him. In 1574 Pope Gregory XIII began on the hill the construction of a palace, which was finished by his successors and used as a summer Papal residence. Since the unification of Italy, in 1870, the palace has been a residence of the king of Italy. The arrangement and decorations are thoroughly modern, and the interior is adorned with famous works of art.

QUITCLAIM. See **DEED**.

QUITO, *ke'toh*, **ECUADOR**, the capital of the country, situated a little to the south of the equator, in a ravine on the east side of the volcano of Pichincha, 9,348 feet above the sea. Its streets, with the exception of four, which meet in the large central square, are narrow, uneven, badly paved and steep. Most of the buildings are low, adobe structures. Among the more important public buildings are the cathedral, several other churches and convents, the townhouse, the courthouse, the president's palace, the university, the episcopal palace, an orphan asylum and a hospital. The manufactures consist chiefly of woolen and cotton goods, saddles, shoes and carpets. The city is provided with electric lights and a good telephone system. It is connected with its seaport Guayaquil, 165 miles distant, by a railroad, and it has telegraph and wireless communication with the other cities of the country and the world. The lack of good roads and railways has prevented the growth of any considerable trade. Quito was originally the capital of a native kingdom of the same name, but the modern town was founded by the Spaniards in 1534. It has repeatedly suffered from earthquakes. Population, about 70,000, largely half breeds and Indians.

QUOITS, *kwoits*, a game played with flattened rings of iron, generally from 8½ to 9½ inches in external diameter, the rim being 1 or 2 inches in breadth. The quoits are convex on the upper side and slightly concave on the under side, so that the outer edge curves downward and is sharp enough to cut into soft ground. Two pins, called *hobs*, are driven into the ground from 38 to 40 feet apart, and the players, who are divided into two sides, stand beside the hob. In regular succession they throw their quoits (of which each player has two) as near the other hob as they can. In throwing the quoit an upward and forward pitch is given it with the hand and arm; this imparts to it a whirling motion, which makes it cut into the ground. The quoit, or pair of quoits nearest the hob count each a point toward the game; if a quoit leans against the hob it is a "leaner" and counts 3; if it encircles the hob it is a "ringer," and counts 5 points. The winning score is 21 points. While regulation quoits are recommended for use, the game is most frequently played with common horseshoes.

QUORUM, a parliamentary or legal term, denoting the number of members of an as-

sembly required to be present for the transaction of its business. This number varies, and usually is fixed by the constitution, by-laws or charter of the organization, or it may be determined by the assembly itself. A quorum is usually a majority of the regular members

In the British Parliament, where the matter is determined by each house for itself, a quorum in the House of Commons is forty members, and in the House of Lords, three. The United States Constitution fixes the quorum of each of the houses of Congress as a majority of all the members elected to each house. It was the former practice in the House of Representatives, in determining a quorum, not to count the members who were present who did not vote on a question, but during the speakership of Thomas B. Reed, all members present were counted, and this is now the regular rule, although not a written one. See PARLIAMENTARY LAW.

QUOTATION, *kwo ta'shun*, **MARKS**, symbols of punctuation used before and after certain expressions. Double marks are used except when a quotation occurs within a quotation; in that case the inner expression is enclosed by single marks. The first set of

marks are inverted commas; the second are apostrophes

The following rules pertaining to their use are generally accepted:

A direct quotation is set off by quotation marks, as General Pershing exclaimed, "Lafayette, we are here"

When several paragraphs are quoted and quotation marks are used, it is customary to place the symbols at the beginning of each paragraph and at the end of the last one

A word or phrase accompanied by its definition is set off by quotation marks, as In military phraseology, "to strike the flag" means to haul it down

Technical, unusual, slang or coined expressions are set off by quotation marks. This is also true of nicknames, popular names of states and cities, pen names and the like. In all of these cases, however, some authorities prefer italics

Either italic or quotation marks are used to set off names of ships, names of pictures and titles of poems, books, lectures, sermons and periodicals

Some authorities place the final pair of quotation marks after the semicolon when that symbol closes the quoted passage. Others place the marks before the semicolon

Quotation marks are used after a question mark, when the quoted passage is a question, as He said, "Are you reading this book?"

QUO WARRANTO. See WRIT.



R, the eighteenth letter of the English alphabet. In Phoenician and in early Greek it resembled a P, and the extra line was added in Latin, after the P assumed its present form. In the pronunciation of English words it represents two somewhat different sounds. The one is heard at the beginning of words and syllables and when it is preceded by a consonant; the other, less decidedly consonantal, is heard at the end of words and syllables and when it is followed by a consonant. In the pronunciation of many English speakers, r, followed by a consonant at the end of a syllable, is scarcely heard as a separate sound, having merely the effect of lengthening the preceding vowel.

RABBI, among the Hebrews, a title of honor, which came into use in the period immediately preceding the birth of Christ. In the time of Christ it was applied to all religious teachers, sometimes to Christ himself. To-day the term *rabb*i is applied to specially-trained teachers of Talmudic Judaism, usually those in a pastoral relation to a Hebrew congregation. In the United States there are seminaries for training Jewish rabbis at Cincinnati, Philadelphia and New York.

RABBIT, a genus of gnawing animals, included in the same family with the hare,

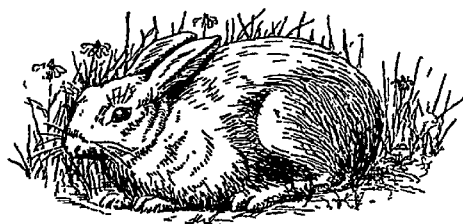
native state, the coarse fur of the rabbit is of a nearly uniform brown color, but under domestication the texture changes and the color may become pure white or pure black, piebald, gray or other hue.

Rabbits are native of all temperate climates, and in the wild state congregate in sandy pastures and on hill slopes. They breed several times a year, beginning at the age of six months, and produce from five to seven or eight at a birth. "Bunnies" should always be handled by the ears, as the body bones are delicate, especially in the young.

Rabbits feed on tender grass and herbage, and often damage young trees by stripping them of their bark. They make affectionate pets, and sometimes exhibit considerable intelligence. The skin of the rabbit, cleared of hair, is used with other skins to make glue and size. The fur is employed in the manufacture of hats and to imitate other and more valuable furs.

Among the best known of the domesticated rabbits are the Belgian (called *Belgian hare*), a true rabbit, easily raised; the *lop-eared rabbit*, distinguished by its long ears; the *Angora*, with a silky coat of long, white hair; the dark, silky-haired *Siberian*; the *Himalayan*, the skin of which resembles ermine; the fancy *silvertip*; and the delicate, white *Pole*.

RABELAIS, *ra b'leh'*, FRANÇOIS (about 1490-1553), a French satirist and humorist, one of the most prominent literary figures of the French Renaissance. He was educated in monastery schools, then entered the Franciscan Order. He was an omnivorous reader, gaining a familiarity with Hebrew and Arabic, and with Greek and Roman classics, and acquiring an encyclopedic learning while yet a young man. After a few years of seclusion he grew weary of monastic life, and in 1530 went to Montpellier and entered a medical school. Subsequently he became head physi-



RABBIT

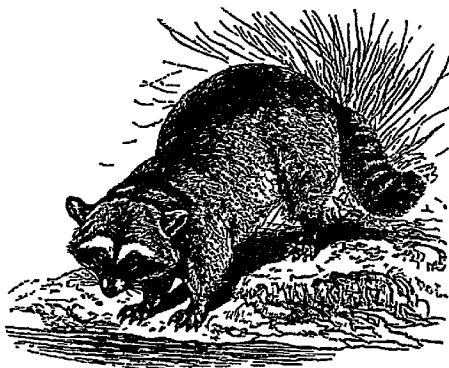
the rabbit being smaller than the hare, and having shorter ears and hind legs. In its

cian of a hospital at Lyons. Towards the close of his life he practiced medicine at Metz, and latterly filled a curacy at Meudon.

Rabelais' great literary production, *Gargantua*, and its sequel, *Pantagruel*, published in its present form at Lyons in 1535, were written as an attack on the social abuses of the day. The work abounds in wit, wisdom and sound common sense. The first part relates the adventures of a huge, long-lived giant, a notorious glutton; the second part recounts the deeds of Pantagruel, king of drunkards.

RACCOON', or **COON**, an interesting and mischievous small American animal, closely related to the bear. It is found from Canada to the tropics, wherever there are forests or patches of woodland. The raccoon is a little larger than a cat. It has a stout body, bushy tail, long legs and strong claws. Its body is covered with long, coarse hair of grayish color, tipped with black. The face is characterized by a sharp, delicate nose, a patch of black around each eye, and a cunning, foxlike expression.

Coons feed upon almost anything. Birds, eggs, frogs, crabs and other small animals are included in their diet, but they are particularly fond of honey, sugar, sweet apples and corn, especially sweet corn in the roasting stage. They are midnight prowlers, and their depredations often exasperate the farmer.



RACCOON

Their favorite nesting places are hollow trees, especially when they can find an opening made by the breaking off of a branch. These animals prefer trees with a rough bark, because they can climb these more easily. When a tree is not available the nest may be made

in a hollow log. In cold climates they hibernate during the winter (see **HIBERNATION**).

The fur is used for robes, coats and other purposes, and the skins bring from four to seven dollars; oil extracted from the fat is worth about eight dollars a gallon, and the flesh is considered a delicacy. Coons are easily tamed and they are quickly fattened, but, notwithstanding these advantages, coon farming has not been developed to any extent, a farm at New Sydney, Nova Scotia, being the only one known. Wild coons, however, are easily trapped and the production of coon fur in Canada amounts to about \$7,000 a year.

The *agouara*, or *crab-eating raccoon*, is found on the American continent farther south than the above species and is generally larger. There is also a Himalayan species, called the *panda*.

RACE, a contest of speed in running, walking, riding, driving, sailing, rowing, swimming or any other mode of progression.

In athletics running races for distances varying from fifty yards to several miles, are among the regular events, and furnish, perhaps, the most interesting contests (see **ATHLETICS**). During the period when bicycles were in great vogue, bicycle races were also common at such meets, as well as at fairs and special race meetings.

Regattas. Intercollegiate rowing races have long attracted wide attention and are not only interesting for the skill displayed by the participants, but are spectacular and thrilling for the spectators. The Hudson River, at Poughkeepsie, N. Y., and Cayuga Lake, at Ithaca, N. Y., are favored for intercollegiate contests. The international yacht races between representatives of England and America have been conducted at frequent intervals for more than eighty years and have invariably aroused the greatest enthusiasm.

Horse Racing, doubtless the most universally enjoyed of all racing sports. It is known as the "sport of kings." In some sections it has fallen into disrepute on account of the demoralization that comes from the betting ring. Besides, on occasion owners of the horses have "fixed" the races, that is, have decided beforehand what horse should win; and whenever the public have learned that the contest was not between horses but between betting rings, they have lost interest

In the United States horse racing has become so interwoven with gambling that it is forbidden by law in several states. However, in connection with legitimate racing, some remarkable records have been made.

The trotting record of all time was set by a gelding, Peter Manning, in 1:56 $\frac{1}{2}$, on October 4, 1922, at Lexington, Ky. Lou Dillon trotted a mile behind a wind shield in the same time. The pacing record in a race was set by Minor Heir in 1910 at 1:59, although Dan Patch, in 1906, in an exhibition heat, covered a mile in 1:55. The running record is the fastest of all; it is 1:37 $\frac{1}{4}$ for a mile, and was made in competition by Kildeer over a straight course in 1892. Dick Welles in 1903, Kiamasha in 1905 and Fern L. in 1908 covered the distance in 1.37 $\frac{3}{4}$.

The famous English Derby has been held at Epsom, England, near London, almost every summer since 1780. It is witnessed by sportsmen from all parts of the world and is made a fashionable society event. The same is true of the so-called Derby races in different parts of America, as at Brighton Beach, L. I., and Louisville, Ky.

Automobile Racing. Automobile races are considered by many the most thrilling of sports. They are international in extent, and attract the most expert drivers in the world. Although attended with great danger, and frequently with loss of life, these races attract thousands of spectators. Courage, staying power and exceptional presence of mind are absolutely necessary to the driver's success and safety. His winning a race depends not so much upon a high speed for a few miles as upon his ability to maintain a terrific speed for the entire distance covered by the course, which may be from 100 to 500 miles. On the Indianapolis Speedway an average speed of more than 100 miles an hour has been maintained on a 500-mile course.

RACES OF MEN. It is a difficult matter to classify mankind, for there is scarcely any one characteristic belonging exclusively to a single race, though climate and other influences have modified the structure of certain races to such an extent that they are easily recognized as differing from other races in distant localities. Scientists have offered many classifications, but none has yet appeared to be altogether satisfactory. The one most generally known is that made by Blumenbach, near the beginning of the nineteenth century. The chief basis of his

classification was the color of the skin, the shape and size of the head and peculiarities of the features. Blumenbach recognized five distinct races, namely, the Caucasian, or white race; the Mongolian, or yellow race; the Malay, or brown race; the Negro, or black race; the American, or red race.

Since Blumenbach's classification was given, a number of others have been made, but none seems entirely satisfactory, although each is the result of more recent research and of new discoveries. The classification most generally accepted at the present time is that by Denker, who is guided by the color and form of the hair, form of the head, form of the nose, color of the skin and stature. This classification divides the human family into six groups and twenty-nine races, listed as follows:

I Woolly Hair, Broad Nose

- 1 Bushmen
- 2 Negrito
- 3 Negro
- 4 Melanesian

II. Curly or Wavy Hair

- 5 Ethiopian
- 6 Australian
- 7 Dravidian
- 8 Assyroid

III. Wavy Brown or Black Hair, Dark Eyes

- 9 Indo-Afghan
- 10 Arab or Semite
- 11 Berber
- 12 Littoral European
- 13 Ibero-insular
- 14 Western European
- 15 Adriatic

IV Fair, Wavy or Straight Hair, Light Eyes

- 16 Northern European
- 17 Eastern European

V Straight or Wavy Hair, Dark Eyes

- 18 Ainu
- 19 Polynesian
- 20 Indonesian
- 21 South American

VI. Straight Hair

- 22 North American
- 23 Central American
- 24 Patagonian
- 25 Eskimo
- 26 Lapp
- 27 Ugrian
- 28 Turkish or Turco-Tatar
- 29 Mongol

Races of Europe. The reconstruction of the map of Europe as a result of the World War awakened a renewed interest in the peoples of the continent and their radical relations. In the following table each group includes kindred peoples who at the close of the war expressed strong desires to form independent nations; as far as possible, their aspirations were respected.

HOMES OF MANY LANDS

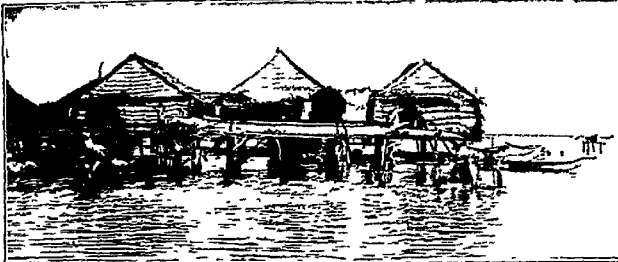


Photo from Keystone View Co., Inc.

One can move like a turtle, taking his house along, if he lives in a boat. Thousands of families at Canton, China, have never known any other home than house boats.

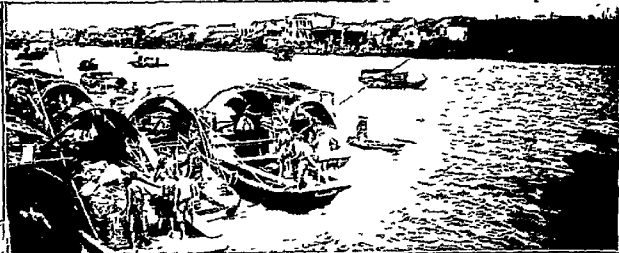


Photo from E. M. Neuman



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"Everybody Works but Father", is true enough in parts of Africa. Masai women building huts while their lords and masters look comfortably on. Why should THEY work! They seem to do nothing but sit around and think, or perhaps they just sit.

In a South Sea Paradise. Samoan native hut. Looks to be all sleeping-porch, doesn't it? Not much more is needed in this delightful climate. It was to this island that Robert Louis Stevenson came to spend the last years of his life.



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HOMES OF MANY LANDS



Photo from Keystone View Co., Inc.

A quaint old English cottage. Note the low, rambling, thatched roof, with its thick moss, the crumbling walls, the small-paned windows. What tales this house might tell of the joys and sorrows of the home life of many generations, of the host of boys and girls that have played about it, and have gone to swell the army of England's workers on land and sea.

A Swiss family and their farm home. This farmer is starting out to manure his little fields. The "Brown Swiss" steer looks quite new, probably a late model. But it's a safe guess that the man's grandfather before him used the cart and the same wooden pitchfork. Quite a contrast to the modern tractor and spreader of our country.



Photo from Underwood & Underwood



U. S. official photo From Underwood & Underwood

A typical village in the far north of Russia. Note the small windows and the heavy timber construction of the houses, reminding one of the log cabins of colonial days. The Russian winter has a grip all its own, and the people of this region must use every means to keep it on the outside of their homes.

The summer home of Eskimos on the shores of the Arctic Ocean. You would think the tent hardly large enough to contain six persons, to say nothing of the dogs. Life even here is changing; note the galvanized iron pail, probably made in our country, and shipped up there.



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Russians	Czecho-Slovaks
Great Russians	Czechs*
Little Russians	Moravians
White Russians	Slovaks*
Cossacks*	Ruthenians*
Baltic Races	Magyars*
Esths (Esthonians)	Poles
Letts*	Jews*
Lithuanians	Gypsies*
Finno-Ugrians	Germans
Finns	Bavarians
Lapps	Prussians
Caucasus Races	Scandinavians
Aryans (Syro-Arabs,	Danes
Ural-Albanians)	Norwegians
Circassians	Swedes
Chechens	Dutch
Armenians	Swiss
Turco-Tartars*	Italians
Rumanians	Maltese
Balkan Races	Iberian Races
Ottoman Turks*	Portugese
Albanians	Spanish
Greeks	French
Bulgarians	Basques*
Serbians	Belgians
Montenegrins	Flemings
Bosnians	Walloons
Croats	Irish
Dalmatians	Brittish
Slovenes	Welsh
Slavonians	Scotch
See articles marked *	English
Related Articles. Consult also the following articles that describe races	
Achaean	Arabs
Dorians	Bedouins
Finns	Canaanites
Huns	Druses
Pelasgians	Hittites
Slavs	Hyksos
Slovenians	Kirghize
Alka	Midianites
Bantu	Moabites
Bechuana	Philistines
Boer	Samaritans
Bushman	Saracens
Hottentots	Seljuks
Kaffirs	Aryan
Matabele	Iranians
Pygmies	Mongols
Zulus	Semites
Angles	Tartars
Cimbri	Teutonic Races
Cymri	Berber
Druids	Copts
Gael	Moors
Goths	Negro
Helvetii	Dyals
Jutes	Igorrote
Lombards	Negritos
Normans	Maoris
Northmen	Esimo
Picts	Indians, American
Sabines	Ghebers
Vandals	Kurdistan
Walloons	Parsees
Ainu	Maharattas
	Kalmucks
	Sikhs

RACHEL, *ra chel'* (1821-1858), one of the greatest of French tragedians, whose real name was Elizabeth Rachel-Félix. She was born in Switzerland, the daughter of a Jew-

ish peddler. As a child she sang in the streets and cafés of Lyons and Paris. When she was nine years old her voice attracted the attention of an eminent music teacher, through whose influence she received musical and dramatic training. At sixteen she made her début at Paris, and a year later made a profound impression as "Camille" in Corneille's *Horace*. In the years that followed she gave a series of classic impersonations in the plays of Racine, Corneille and Voltaire, and with stupendous success. As "Phèdre" in Racine's play of the same name, she reached the height of her artistic powers, and it is doubtful whether her performance of that part will ever be surpassed on any stage. Rachel played throughout France and Belgium and in England and America. She died of tuberculosis and was buried in the Jewish section of Père Lachaise cemetery, Paris.

RA'CHEL, the favorite wife of Jacob (*Genesis XXIX, 20*). For her he served her father, Laban, seven years, "and they seemed to him but a few days for the love he had to her." The story is one of the most beautiful love stories of the world's literature. Rachel was the mother of Joseph and Benjamin. She was considered the tribal mother of the northern tribes, and when they were carried into captivity she was represented in the poetry of the time as refusing to be comforted (*Jeremiah XXXI, 15*). This passage is quoted in the account of Herod's slaughter of the Innocents:

Rachel weeping for her children,
And she would not be comforted because they are not

RACINE, *ra seen'*, JEAN (1629-1699), one of the foremost writers of tragedy, born at La Ferté-Milon. He received a classical education and became thoroughly familiar with the masterpieces of Greek drama, especially so with those of Sophocles and Euripides, which he chose as his models. In 1662 he went to Paris, was presented at court and became the friend of Molière, Boileau and La Fontaine. His seven masterpieces—*Andromaque*, *Britannicus*, *Bérénice*, *Bajazet*, *Mithridate*, *Iphigénie* and *Phèdre*—were all produced before the year 1677.

Racine's chief characters were women, in whom passion was the controlling force. In his plays everything is subordinated to dramatic effect, and character delineation is of secondary importance. A poet of cultured and fashionable society, Racine never came in

close touch with the masses, but notwithstanding this limitation of experience he possessed dramatic gifts which place him among the greatest French tragic poets.

RACINE, Wis., the county seat of Racine County, twenty-four miles south of Milwaukee, on Lake Michigan, at the mouth of Root River, and on the Chicago & North Western and the Chicago, Milwaukee, Saint Paul & Pacific railroads and electric lines. It has a good harbor and there is freight and passenger service by water. Racine is an important manufacturing center, producing automobiles, malted milk, agricultural implements, flour, threshing machines and other articles. Population, 1930, 67,542.

RACK, an instrument of torture, formerly used to punish or to extract confessions from suspected criminals. It consisted of a large, open oblong frame made of four wooden beams. The person to be tortured was laid on his back on the floor space enclosed by the rack, and his wrists and ankles were bound to rollers at opposite ends of the frame. The rollers were then rotated in contrary directions until the prisoner confessed (and was released) or his body was rent. The rack was used by the Romans in the first and second centuries, and many Christians suffered upon it. It was also used during the Inquisition.

RADCLIFFE, *rad'klif*, **COLLEGE**, an educational institution for women, founded at Cambridge, Mass., in 1879, by the Society for the Collegiate Instruction of Women. It was at first known as the Harvard Annex though it had no official relation with Harvard University until 1894, when by act of the General Court of Massachusetts its name was changed to Radcliffe College, in honor of Ann Radcliffe, the first woman to give a money endowment to Harvard. The requirements for admission and for degrees are identical with those of Harvard College, and the courses of instruction, in the main duplicates of those in Harvard College, are given for the most part by members of the Harvard University faculties. See **HARVARD UNIVERSITY**.

RADIA'TA, in the classification of the French naturalist Cuvier, the lowest of four great divisions of the animal kingdom. The classification was based on the fact that in members of this group the parts of the body are grouped radially like the spokes of a wheel. See **COELENTERATA**; **PROTOZOA**.



RADIO. People who live in the United States and in Europe are beginning to feel that radio is an everyday affair. Yet it is probable that nearly one half of the two billion people who inhabit the earth have never heard a broadcast program. There are millions of people in China and in Africa who have never even dreamt that it is possible "to catch music out of the air." The beating of jungle drums, flashes of light reflected from a bright surface, smoke signals of the Indians, wigwagging with the arms are the only methods of long distance communication known to millions of people today. The radio, like the telephone and the telegraph, is a wonder of the present age, but commonplace among civilized peoples. Reaching vast audiences, the radio challenges even the press as one of the most effective instruments for molding public opinion and creating buying habits.

History of Radio. James Clerk Maxwell worked out the basic principles of radio theoretically in 1864, his mathematical treatise has been called the electromagnetic theory of radiation. The actual discovery of radio was first made by Heinrich Hertz in 1887 when he succeeded in transmitting a feeble message across a room in his laboratory. After him, a number of men studied the "Hertzian waves." Radio was still only a series of technical experiments until the work of Marconi, who was able to transmit messages a distance of 15 miles in 1897 and across the Atlantic Ocean in 1901. This constituted a marvelous step forward in the field of communication; an age-old dream of man had come true. Meanwhile, Fleming had used a glass bulb, evacuated and containing not only a hot filament, as in electric light bulbs, but also a cold metal plate, to help receive the radio messages. In 1906, Lee de Forest added a third element to the Fleming valve, a grid of wires between the filament and the metal plate. This three-element vacuum tube or triode opened a new era in radio telegraphy and telephony. It has since been developed and expanded into more complex forms by researches of the

large electrical companies and is, today, the very heart of both transmitting and receiving sets. At the time of the World War, Armstrong invented the super-heterodyne principle and, in 1920 or thereabouts, the broadcasting of speeches and musical programs expanded rapidly into our homes. The "SOS" distress signal has now become a familiar by-word in our daily lives; there are thousands now living whose lives were saved by the use of radio. Hundreds of improvements over the early crude equipment and methods have been made in order to increase the distance of transmission, messages have been received which have travelled not only once but as many as four times around the earth. Other hundreds of improvements have been made to insure the clarity and faithfulness in reception of radio messages; one can now recognize not only what is being said but also the particular speaker's voice peculiarities or the individuality of a musical artist. Nor has the fullest development of radio been reached.

The Radio Transmitter The electric current which flows out of an ordinary dry cell to operate a flashlight passes along the wires in but one direction; this is called a direct current. The electric current which operates many of our home-lighting bulbs passes along the wires first in one direction for a short time and then in the opposite direction for an equal time, this is called an alternating current. The electric current which surges back and forth in the aerial wires of a radio transmitter makes a complete round trip in as short a time as one-millionth of a second, this is called a high-frequency current. In order to produce this rapidly oscillating current, electricity is sent into a condenser, or electrical storage tank, after which it is allowed to pour out through a coil of wire. In so doing, it builds up a magnetic field around the coil, forming, for a brief instant, a small magnet. When the condenser has emptied, the current ceases to flow and the magnetic energy around the coil returns to the wire, thus producing a current which refills the condenser in the reverse direction. This process repeats itself many times each second. If the condenser and the coil are large enough, it may take ten seconds for a single oscillation of the current. An electric light bulb, connected between the coil and the condenser, will flash once every ten seconds. If the condenser and coil are

somewhat smaller, the current may surge back and forth a hundred times each second. A loud speaker connected in this circuit would then give out a low-pitched note, stirring the air in front of it a hundred times each second. With still smaller equipment, the sounds produced would rise in pitch to become inaudible at about 20,000 vibrations per second, the upper limit to which the human ear can respond. If the loud speaker is removed and the apparatus is made smaller and smaller in size, higher and higher frequency surges of electricity will result. Then a strange thing begins to happen, feebly at first but with increasing strength as the oscillations become more rapid; radio waves begin to leak off from the wires. Just why this is so, nobody knows exactly—any more than they know why light leaves an electric bulb or why heat radiates from a flat-iron.

The secret of producing this so-called carrier wave of radio is to generate an electric current which is going back and forth in the wires with sufficient rapidity,—say 50,000 or more times each second. Perhaps you have seen "500 Kc" stamped on the dial of your radio set. That stands for 500 kilocycles, meaning 500,000 cycles, or one half million vibrations, each second, the figure indicates the rate at which the electric current is oscillating in the transmitter of the sending station whence your program comes when your dial is set at that position.

In Figure 1, you see a diagram of an equipment by which it is possible to generate these high-frequency currents. It is a miniature broadcasting station, using the Hartley oscillator. *L* is the coil of wire; *C* is the condenser, consisting of metal sheets separated by some insulator such as air. The

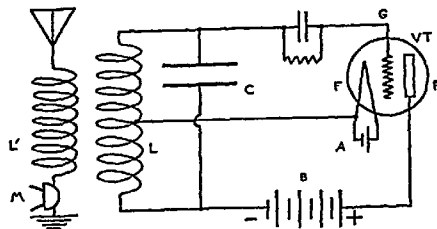


FIG. 1 A RADIO TRANSMITTER

purpose of the triode, or vacuum tube, VT is to refill the condenser in order to allow for the energy which, at the high frequencies, has passed through the coil *L'* to the aerial

and out into space. The energy originally came from the battery *B*. In the vacuum tube, *F* is the filament which is heated by the battery *A*, while *P* is the metal plate and *G* is the grid.

Modulation. In order to send signals on the carrier wave, one may connect a key in the circuit to start and stop the current as desired, for instance, to produce the Morse Code of dots and dashes. If it is desired to transmit the voice or music, one may connect a microphone as at *M* in Figure 1. There are, of course, more elaborate and better ways of connecting the microphone, such as the Heising or constant-current method, but the arrangement shown will work for small stations.

The microphone is very like the transmitter of the telephone into which you speak; it offers a certain opposition to the electric current flowing through it. When you speak into the mouthpiece of a telephone, you change this resistance to the current, if you speak loudly, the fluctuations of the current are large, if you speak softly, the fluctuations are small. If your voice is low-pitched, the fluctuations, the increases and decreases of current, occur slowly but, if your voice is high-pitched, the rapidity of change is high. Thus these changes in the current result and faithfully reproduce the sounds at the receiving telephone.

The radio microphone likewise modulates the carrier wave.

Your voice, as such, is not carried out over hill and dale on the radio's carrier wave;

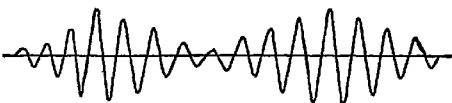


FIG. 2. A MODULATED CARRIER WAVE

your voice merely serves to alter the form of this wave. The transmitting aerial sends out a modulated carrier wave such as is shown diagrammatically in Fig. 2.

Propagation. Radio waves travel at the prodigious rate of about 186,000 miles each second, which is equivalent to seven and one-half times around the earth in one second, equal to the speed of light. In fact, light waves are the same as radio waves except that light waves are very much shorter. Radio waves are only a small part of the total electromagnetic spectrum. They constitute the long rays at one end of the spec-

trum and have wave-lengths, i.e., distances from crest to crest, ranging from several miles down to a thousandth of an inch. Radio, heat, light, ultra-violet light, X-rays, and gamma waves are all the same except that their wave-lengths are shorter and shorter, in the order named.

Radio waves pass over mountains and valleys and are but little absorbed by buildings or human beings. They travel out in every direction from the transmitting station, hence, the receiving station or set, located at only a small point in the sphere of transmitted waves, picks up only an infinitesimal part of the total energy transmitted. The carrier waves are truly cast broadly into space. However, they may be partially concentrated along a beam by special types of aernals.

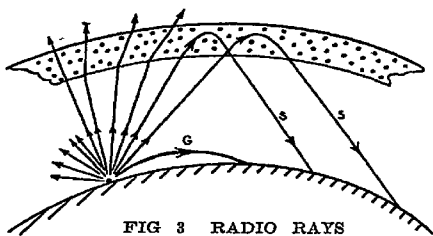


FIG. 3 RADIO RAYS

The receiving set must amplify greatly the weak signals which the receiving aerial picks up. Some of the carrier waves travel skywards and may be returned to earth by reflection or, more correctly, by refraction from the ionosphere. The ionosphere, sometimes spoken of as the Kennelly-Heaviside layer, consists of two and possibly three layers of electrically charged particles located from 80 to 400 miles above the earth's surface. These reflecting layers constantly fluctuate both as to position and as to density, and probably account for the fading which we notice in reception of programs coming from a long distance. In the case of the shorter radio waves, below 200 meters in length, those waves which travel close to the earth, such as *G* in Figure 3, die out at about 100 miles from the sending station; the sky-waves, on the other hand, such as *S*, do not get back to earth inside of several hundred miles. As a result, there is a zone of silence encircling short-wave transmitters.

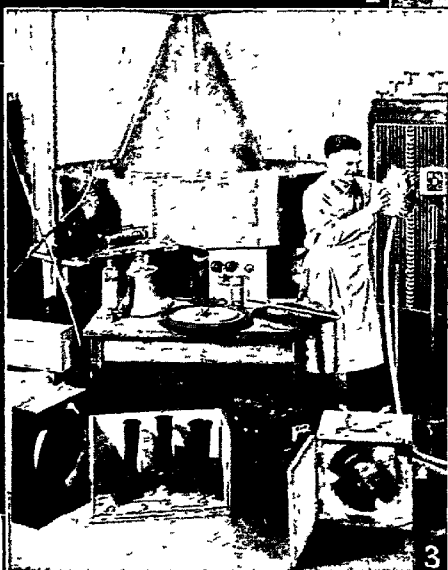
The distance to which a transmitter can send does not depend on the length of the waves which it generates but rather upon its



1



2

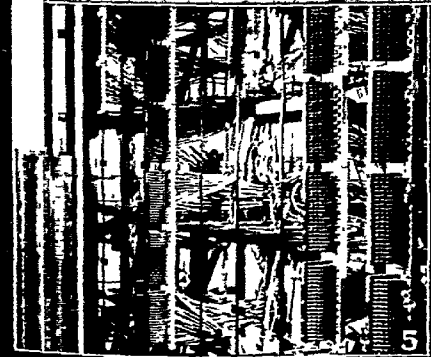


3

1 Looking back twenty years, the "talking bottle," from which today's vacuum tubes developed 2 Present-day power-amplifier tube, at right, used with 50,000-watt transmitter, at left, one of the rectifier tubes used to supply 18,000-volt current to larger tube 3 Sound equipment devices, the man is producing sound of rain 4 Making electrical transcription of an address 5 Network of wiring under control room of large studio

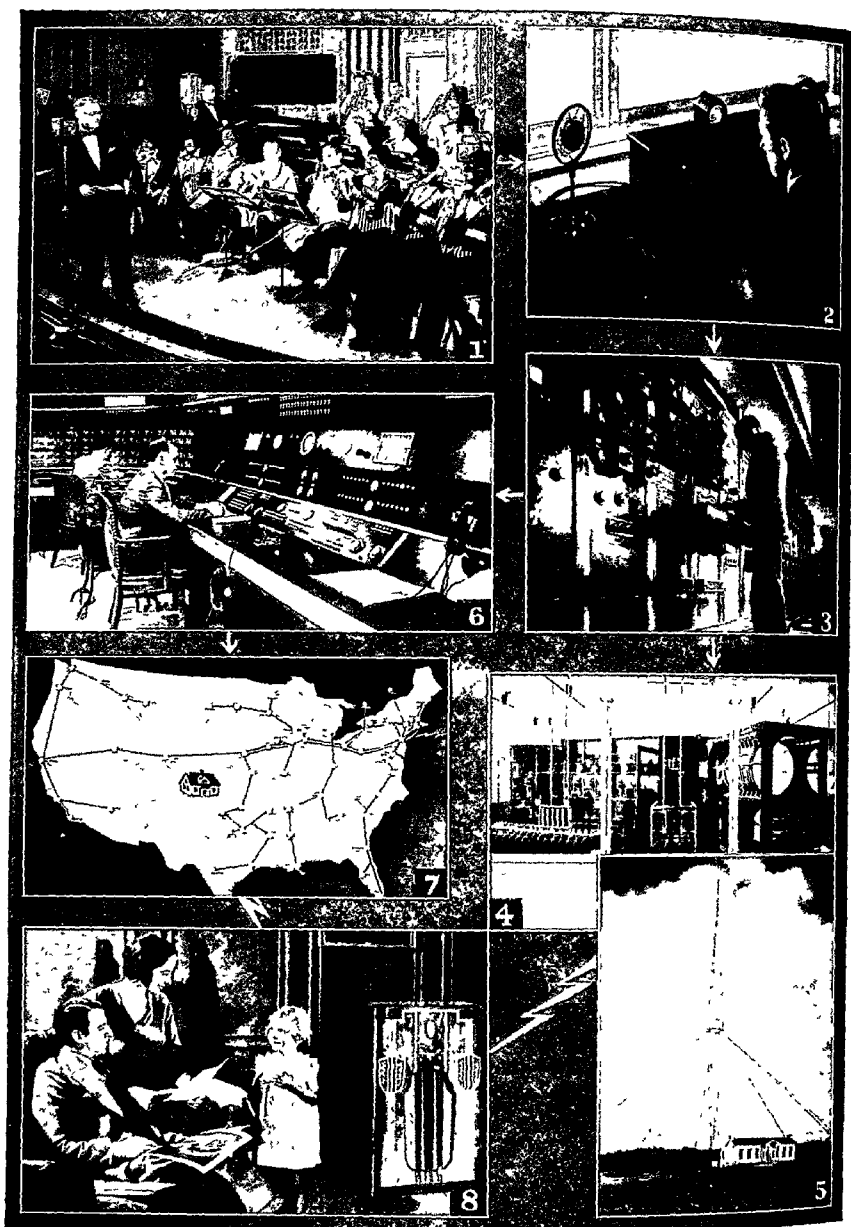


4



5

SOME OF THE MECHANICS OF A BROADCASTING STATION



SENDING A PROGRAM TO MILLIONS OF LISTENERS

1 Program in presentation in studio 2 Control man adjusting volume of sound before it reaches main control room 3 Switchboard in central control room adjusts volume sent to broadcasting stations 4 Transmitting equipment—rectifiers at left, tuning condensers at right 5 Transmitting tower 6 Master control panel, connecting with nationwide network of stations 7. Light spots show branch transmitting stations.

number of watts, i.e., the power used in its electrical circuits.

The Radio Receiver. When the radio carrier waves slash across the aerial wire of your receiver, whether they be located on your roof or in your room or in your car, they produce feeble electrical currents which vibrate back and forth at the same rate as at the transmitter. Their strength increases and decreases in exact accord with the sound waves which entered the microphone. A condenser and a coil of wire are used in the receiver to pick up only those waves of a desired frequency. When you turn the dial of your receiver, you are changing the size

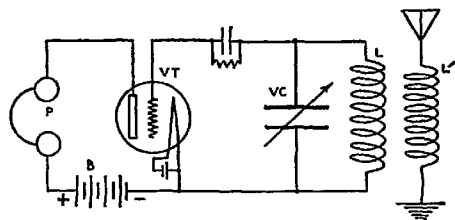


FIG. 4. A RADIO RECEIVER

of the condenser, adjusting it until the circuit of your set is in tune with that at the transmitter. In Figure 4, you see a diagram of the coil *L* and of the variable condenser *VC*.

The vacuum tube in the circuit of Figure 4 serves two purposes. It detects and strengthens the signals. The modulated carrier wave is placed on the grid of the tube and controls the amount of current which can flow out of the battery *B* through the phones *P*. Electrons emitted by the hot filament serve to carry the current across the vacuum in the tube to the plate. The grid acts like a shutter or valve to regulate the number of electrons which reach the plate. The carrier wave is eliminated by the vacuum tube, leaving only the sound currents to operate the phones.

Several tubes may be used, one after another, to increase the strength of the signals. In the super-heterodyne type of receiver, the carrier wave is first converted into one of lower or intermediate frequency, when amplification may be accomplished with greater ease. After this amplification, the intermediate frequency is eliminated and the voice frequencies are still further amplified and used to operate a loud speaker.

Social Implications of Radio. By means of our radio, we can sit in our easy chair

and listen to the finest music in the world, whether we live in a mining shack in the mountains or in a palatial residence on Riverside Drive; we can dance to our favorite melody king on the veranda of our summer cottage; we can listen to our President or our great statesmen—or we can pick up a new recipe for noodles au gratin. Radio classes in foreign languages, political economy, and English are to be had with the turning of a dial. We can turn the set on or off as we please. The educational and the entertainment features or values of radio are recognized by all of us, for we have experienced them ourselves. In a sense, the radio is knitting people closer together, eliminating dialects, giving us common viewpoints on both local and international affairs, creating common interests in our everyday life.

There occurs a hurricane in Florida, an earthquake in Japan, a flood in China. The world is advised of the catastrophe in the flash of an eye, rescue crews are promptly dispatched and money is collected to help the stricken people. The universally used "SOS" signal via radio brings prompt aid to vessels in distress. Justice is aided by the quick response of police cars equipped with radio.

An aeroplane controlled solely by radio on the ground, without a human being in it, rises majestically into the air, soars through turns and dips for fifteen minutes and returns safely and smoothly to the ground. Modern airplanes and dirigibles carrying passengers maintain constant contact with ground stations, for guidance in emergency. Many other uses are found for radio, both for entertainment and for profit. What its future possibilities are nobody can yet say.

In the United States the majority of the programs put on the air by radio are supported by commercial advertising, the listener's expense being limited to the purchase and upkeep of his receiving set. In Great Britain and other countries, broadcasting is a government monopoly, the programs being provided and censored by the authorities, with a minimum of commercial advertising, the proceeds of a tax on owners of receiving sets being applied to maintaining the expense of the broadcasting system. See *ELECTRICITY, TELEGRAPH, TELEPHONE*.

RADIOLARIA, *ra di o la' ri ah*, a group of one-celled marine animals belonging to the lowest order in the animal kingdom (see

PROTOZOA). There are thousands of species, and most of the individuals are microscopic in size and encased in a shell of silica, usually of great beauty. The name has reference to the threadlike protoplasm which radiates in all directions from the cell body.

RADIUM, the most valuable and possibly most wonderful substance in the world, is a metallic element discovered in 1902 by Professor and Madame Curie, at the Paris Industrial School of Physics and Chemistry. In its pure state radium resembles silver, but it is used in the form of chloride, which looks like common salt. In proportion to its weight radium is a hundred times more valuable than diamonds. A tiny tube of it the size of a small straw and less than an inch in length is worth more than \$4,000.

Properties. The wonders of radium are not yet fully known, and the cause of its intense activity has not been discovered. The activity is learned only through the effects it produces. If a small tube of radium is placed in a man's vest pocket and allowed to remain an hour or two, it causes a burn, but the effect may not appear until some days after the cause has been removed, when the skin begins to dry and crack, and in a short time to slough off. If a tube of radium is placed on a surface coated with sulphite of zinc or some similar substance the surface becomes luminous.

Radium discharges electrified bodies, and affects photographic plates. If a photographic plate is wrapped in black paper and an opaque object such as a penny is laid on the paper with the coated side of the plate up, and the plate is enclosed in a dark box with a tube of radium, a radiograph of the object will be produced in the plate. This experiment is often used in testing ore suspected of containing radium, a small quantity of the ore being used in place of the radium. If radium is present, a picture of the object will appear on the plate when it is developed.

Radium sometimes produces severe burns and ulcers, and tubes containing it should not be handled with the bare hands, even for a short time. A marked peculiarity of radium is that its intense activity does not cause any appreciable loss of power or weight. A tube once filled with it could be used for centuries, and at the end of this period the radium would be as effective as at the beginning.

Uses in Medicine. Radium is employed quite successfully in medicine in the treatment of ulcers, tumors, and a few skin diseases. It is usually successful in curing superficial cancers, but its application to cancers that are deep-seated has not been attended with success.

Production of Radium. In 1896 it was found that uranium and all its compounds continually emit radiations and have a penetrating power similar to that of the X-rays. Professor and Madame Curie followed this discovery with a series of experiments on the ore of uranium, commonly known as pitchblende, and they obtained a pure radium chloride in 1902. The excessive rarity of radium may be judged by the fact that Mme. Curie obtained only about 0.2 gram from a ton of uranium residue. For some years after the discovery of radium it was generally believed that the mines under control of the Austrian government, located at Joachimsthal, Bohemia, constituted the greatest source of the world's supply of this valuable substance. Later, however, deposits of ore were discovered in Sweden and Wales. It was long believed that pitchblende was the only ore from which radium could be obtained. Then analyses of other ores of uranium showed that they contained radium. Extensive deposits of carnotite, an abundant source of radium, have been found in Colorado and Utah. In 1931, large deposits of pitchblende, rich in radium, were discovered in Canada. The United States Bureau of Mines has established a laboratory in Denver, which, with the cooperation of the American Radium Institute, was enlarged.

RAGWEED, an annual weed, common in rich, damp soils. It is found in Europe and receives its name from the ragged appearance of its leaves. The flowers are small and golden yellow in color. The *great ragweed* is a species confined to southern, central and eastern states. Its flowers grow in great clusters and are commonly found by the side of roads and in pastures; in midsummer, when they mature, their pollen, widely scattered by the winds, is largely responsible for the malady known as hay fever.

RAIKES, *rayks*, ROBERT (1735-1811), an English publisher and philanthropist, founder of the Sunday School. He was born at Gloucester, England, where from 1757 to 1802 he published the *Gloucester Journal*, a paper which he employed in the cause of re-

form. On a Sunday in July, 1780, he opened his first school for the purpose of giving to poor children the rudiments of a religious education. See SUNDAY SCHOOLS.

RAIL, the name of a group of birds related to the coots and gallinules. The rail is about a foot long, and generally is gray



RAIL

and brown in color. It is a poor flyer, but it runs swiftly. While a few of the birds are found on dry land, most of them live in the marshes, and many are expert swimmers and divers. The nests are built among grasses, and the eggs, from seven to fifteen, are buff, speckled with brown. The commonest of the European rails are known as *corn crane*, *water rail* and *land rail*. Among familiar American species are *Virginia rail*, *king rail* and *clapper rail*. See BIRDS, *color plate*; Coot.

RAILROAD, or RAILWAY. Until the advent of the railroad, land communication was no more rapid than in the time of the Caesars or even of Alexander the Great. When Caesar crossed the Rubicon to challenge the power of Rome, he rode as comfortably and as rapidly as did George Washington two thousand years later when he journeyed on horseback from Mount Vernon to New York to be inaugurated President of the United States.

The First Railroads. As early as 1602 tramways were constructed to haul coal from some of the mines in England. They were made of wooden rails or beams laid on a road bed for the wagons to run on. Later, strips of iron were fastened to the beams to protect them from the wear of the wheels. In a few years the beams were replaced by cast-iron rails. The wagons were hauled by horses. The modern railroad dates from the construction of the Stockton & Darlington Railway in England, which was completed in 1825. It was on this road that steam power was first successfully used, although in a very crude way.

The first railway in the United States was

built from the granite quarries in Quincy, Mass., to the coast, and it was designed for conveying stone for the Bunker Hill Monument. This line was completed in 1826. The following year the Delaware & Hudson Canal Company began building a road from Honesdale, Pa., to their coal mines at Carbon-dale, a distance of sixteen miles. On both of these lines the cars were hauled by horses. The first attempt to use a steam locomotive in America was made in 1829, when an engine was used on the small road built by the Delaware & Hudson Canal Company. The first railway built originally for the purpose of using steam locomotives was the South Carolina, work being started in 1830. The Baltimore & Ohio, started in 1828, began using steam locomotives in 1831. This was the first road built for the purpose of carrying both freight and passengers, and it was also the first of those great trunk lines that now constitute the main arteries of the American railway system.

Present Systems. From these small beginnings the American railway system has grown to its present proportions. The early lines were gradually extended westward. In 1860 there were about 30,000 miles of railroad in the United States. During the Civil War construction was practically suspended. However, after the close of the conflict the work was taken up with renewed activity, and in 1869 the first transcontinental railroad line was completed, joining the Atlantic and Pacific oceans. From that time on railway construction has kept pace with the development of the country, until now there are in the United States almost 260,000 miles of railway lines, exclusive of second tracks and sidings, which add over 140,000 more, making in all about 400,000 miles, nearly one-half of the railway mileage of the world. The operation of the railroads of the United States requires the employment of more than 1,700,000 men.

Other Countries. The railroad mileage of the other leading countries is as follows:

Great Britain	20,500
Canada	40,570
British India	39,700
Australia	25,800
Germany	34,000
France	27,000
Russia	47,000
Argentina	24,000
Brazil	19,600
Mexico	12,000
Italy	12,800

Consolidation of Railroads. The first railroads were short lines and were built with little thought of connecting with other lines. This caused numerous annoyances. Freight shipped over different lines had to be reloaded at each terminus, and passengers were required to change cars frequently. Originally no fewer than six separate railroads composed what is now the New York Central, extending originally from New York City to Buffalo, and this condition characterized most other lines in the country. The first movement toward uniting the New York Central lines into a gigantic system extending westward to Chicago consisted in making a traffic arrangement, by which the different companies agreed to haul each other's cars over their lines. As the roads extended westward and the movement of freight became more complicated, transportation companies were formed for the purpose of handling through freight. The success of these combinations led the stockholders of connecting lines to unite their roads under a single corporation, the final step consisting in uniting competing lines into systems. Among the most extensive of these systems are the New York Central, the Pennsylvania, the Southern Pacific, the Atchison, Topeka & Santa Fé, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee, St. Paul & Pacific, the Chicago & North Western, the Union Pacific, the Northern Pacific, the Southern Pacific, and the Illinois Central. All except the New York Central, the Pennsylvania and Illinois Central form connections which extend their lines from Chicago and other points in the Mississippi Valley to the Pacific coast, and are generally known as *transcontinental systems*.

Improvement in Equipment. Our great-grandparents in their day endured many hardships in railroad transportation. While there was an attempt to build a railroad sleeping-car as early as 1837, it was not until Pullman began to develop his dream of a sleeping-coach in 1859 that a new era in long-distance travel opened. Many living today remember when passenger coaches were heated by wood stoves and lighted by kerosene lamps. A train even forty years ago that averaged 25 miles an hour was considered speedy, though a few maintained much greater speeds—between New York and Chicago, for example, in twenty hours.

Today Pullman cars provide the luxury of a drawing-room; they are electric-lighted, adequately heated from the locomotive, and on many trains are air-conditioning systems. A new era in comfort and speed began in 1934 with a new style of stream-lined trains of light construction, powered by Diesel engines, that maintain a speed of a mile a minute on runs of 400 miles, with powerful locomotives evolved from earlier types the New York-Chicago schedule has been reduced to almost an overnight run.

Freight is now given express service on every great railroad system; trains composed solidly of refrigerator cars cross the continent at speeds of 50 miles or more per hour.

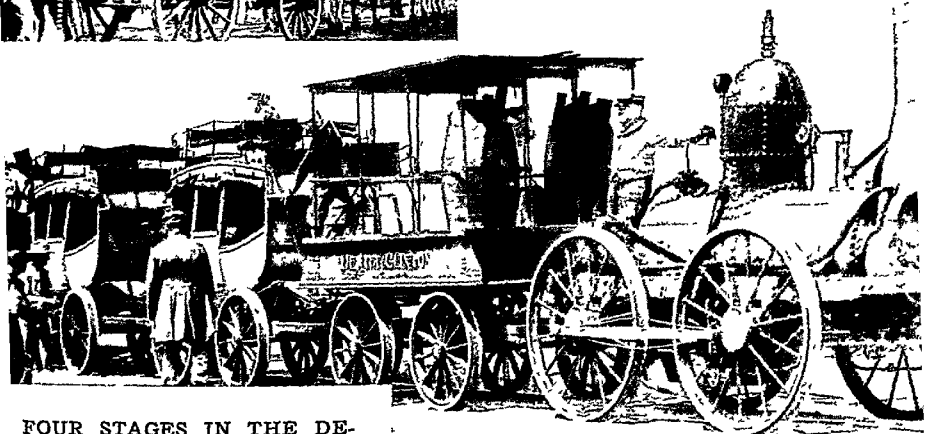
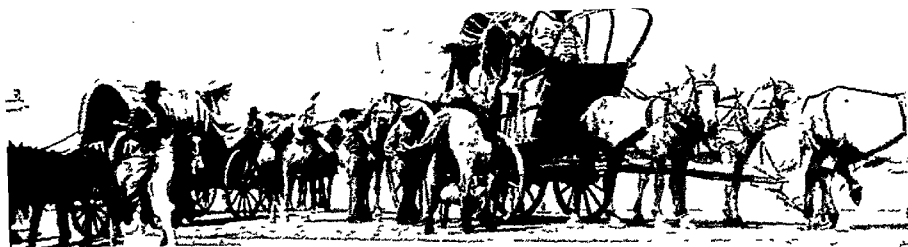
Railroad Competition. The rail companies have been hard-pressed to maintain their position as favored passenger and freight carriers by the advent of the automobile, the autobus and the airplane. Automobiles and the comfortable autobus carry passengers long distances at 50 miles an hour or better on perfect roadbeds; great trucks holding tons of merchandise lumber over the highways and can cover several hundred miles in a day, the fleet airplane can carry passengers, express, and mail from ocean to ocean almost between dawn and darkness.

These modern innovations have seriously crippled railways, and they have been forced to the expenditure of hundreds of millions of dollars to meet the challenge of other methods of conveyance.

Related Articles. Consult the following titles for additional information

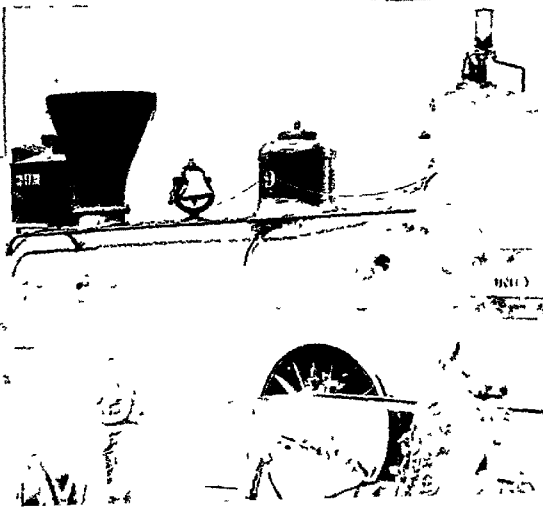
Air Brake	Locomotive
Cape-to-Cairo Railway	Mono-Rail, Suspended
Carrier, Common	Public Utilities
Electric Railway	Semaphore
Eminent Domain	Transportation
Interstate Commerce Act	Trans-Siberian Railway

RAILROADS OF CANADA. Canada has the greatest railway mileage in proportion to population of any country in the world. In a country of such vast extent means of transportation and communication play a great part in development. It is only necessary to point to the remarkable growth in population in the west after the introduction of railways, to the present irrigation projects of the Canadian Pacific in Alberta, to the grain elevators and hotels which the railroads have built throughout the country, to show that the railroads do more than haul traffic. The mere fact of transportation is an impulse beside which all other impulses toward growth become small.



**FOUR STAGES IN THE DE-
VELOPMENT OF MODERN
TRANSPORTATION**

Prairie Schooners, Stage Coach;
"DeWitt Clinton" Steam Engine,
East and West united by steel rails

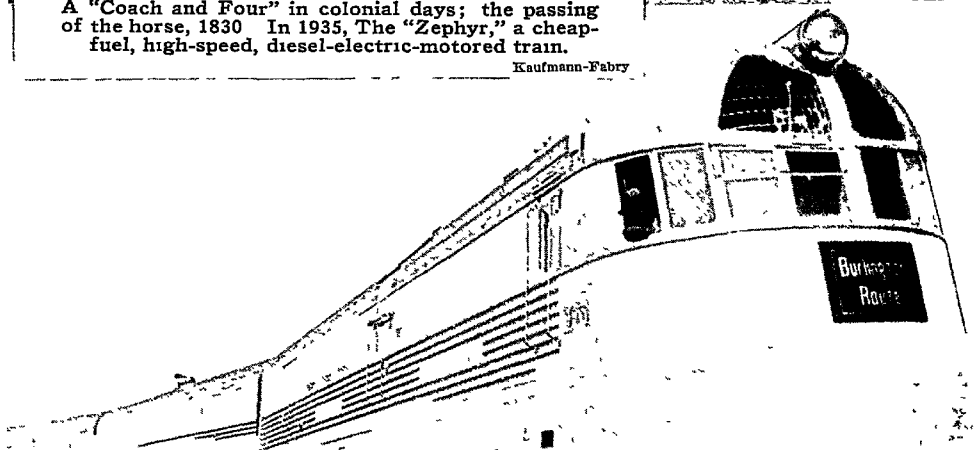




THEN AND NOW

A "Coach and Four" in colonial days; the passing of the horse, 1830. In 1935, The "Zephyr," a cheap-fuel, high-speed, diesel-electric-motored train.

Kaufmann-Fabry



The following table will give some idea of the increase in steam railway mileage in Canada:

YEAR	MILES	YEAR	MILES
1846	16	1896	16,270
1856	1,414	1906	21,429
1866	2,278	1914	30,795
1876	5,218	1924	40,570
1886	11,793	1934	42,300

In 1836 the first railroad in Canada was built between Laprairie, near Montreal, and St John. Ten years later another short line connected Montreal and Lachine. The railway system of Canada had its real beginning, however, in 1851, when Parliament passed a bill providing for the building of the Grand Trunk road from the western limit of Upper Canada to the City of Quebec and also a branch line to Portland, Maine. The Portland branch was completed in 1853, and the main line from Sarnia to Quebec three years later.

The great trunk lines of Canada are the Canadian Pacific, which has remained powerful and independent, and the Grand Trunk, the Canadian Northern, the Grand Trunk Pacific, and the Intercolonial. The last four, owing to financial difficulties which beset them about the time of the World War, were taken over by the Canadian government in 1919 and 1920 and since then their operation has been under the name Canadian National Railways. To the main lines named as a part of this system numerous short lines in the eastern part of the Dominion have also been linked.

RAIN. One who has never lived in a rainless region cannot fully appreciate the blessings conferred upon the earth by the rain. This thought is beautifully expressed by Shelley in his poem *The Cloud*:

I bring fresh showers for the thirsting flowers,
From the seas and the stream;
I bear light shade for the leaves when laid
In their noonday dreams

Water is necessary to the growth of plants, and where there is no rain the earth is a desert. Few animals live where there is no plant life, so we may truthfully say that all life upon the earth depends upon rainfall.

How Rain is Formed. The sea and land are the great sources from which the rain comes, and the sun is the great engine that draws the water up into the air, from which it falls again to the earth. Evaporation (which see) is constantly taking place, and the air always contains more or less water

vapor. The quantity of vapor which the air can hold depends upon its temperature, the warmer the air the more water vapor it can contain. When air has all the water vapor it can hold it is said to be *saturated*. When the temperature of saturated air is lowered the air must lose some of its moisture, which falls in the form of rain or snow.

Wind is one of the chief agencies in causing rainfall. Whenever a warm wind laden with moisture blows towards a cooler region clouds begin to form, and in a few hours the rain may fall. Sometimes a warm upward current ascends until it reaches a layer of cool air, where its moisture is condensed and thrown back to the earth in a local shower.

We notice that raindrops vary in size. The largest drops are nearly a quarter of an inch in diameter, and the smallest ones are scarcely visible, and we wonder why this difference. Observation of rain under all the conditions that a locality affords shows us that the largest drops fall in showers that form suddenly, and that they come from clouds high up in the sky. The shower has been formed so quickly that the air between the cloud and the earth is still heavily charged with moisture, and some of this moisture is added to the drops in their rapid journey from the cloud to the earth. In a general rainfall the clouds are low, and the vapor in the atmosphere is condensed before the rain begins to fall.

What Rain Does. Rain supplies the moisture to sustain plant and animal life, it fills the springs and the streams, indirectly carries soil from the hills to the valleys, where it is deposited by the streams on the lowlands, and cleanses the atmosphere of its impurities, one of its greatest benefits. Meteorologists have estimated that a five day's rain in London, England, will wash from the atmosphere 3,738 tons of soot and other impurities.

Meaning of One Inch of Rain. On every daily weather bulletin or chart the amount of rainfall at various places during the preceding twenty-four hours is printed in inches and hundreds of inches. In a general way the public understands that a rainfall of two inches in one day is heavy, and that one of a tenth of an inch is light, but no attempt is made to associate the linear measurement of the water with its equivalents in weight or bulk.

An acre of ground contains 43,560 square feet. Consequently a rainfall of one inch over one acre of ground would mean a total

of 43,560×144, or 6,272,640 cubic inches of water. This is equivalent to 3,630 cubic feet. As a cubic foot of pure water weighs about 62 4 pounds, the exact amount varying slightly with the density, it follows that the weight of a uniform coating of one inch of rain over one acre of surface would be $3,630 \times 62 4 = 226,512$ pounds, or $113\frac{1}{4}$ short tons.

The weight of one United States gallon of pure water is 8.345 pounds. Consequently a rainfall of one inch over one acre of ground would mean $226,512 \div 8.345 = 27,143$ gallons of water on the acre. This is equivalent to 603 barrels of forty-five gallons each, and would be sufficient to fill a tank or pool about twenty feet square and nine feet in depth.

Distribution of Rain. The average rainfall in a year at any given place depends on a great variety of circumstances, the most important of which are latitude, proximity to the sea, elevation of the region, configuration of the country and exposure to the prevailing winds. When the vapor-laden atmosphere is driven toward mountain ranges, it is forced upward by the latter and is consequently cooled, partly by coming into contact with the cold mountain tops, and partly by the consequent expansion of the air, due to the greater elevation. As the temperature is lowered, the moisture is condensed and falls as rain or snow. The presence or absence of vegetation has also considerable influence on the rainfall of a district. Land devoid of vegetation has its soil intensely heated by the fierce rays of the sun; the air in contact with it also becomes heated and is able to hold more and more moisture, so that the fall of rain is almost impossible. On the other hand, land covered with an abundant vegetation has its soil kept cool and thus assists in condensation.

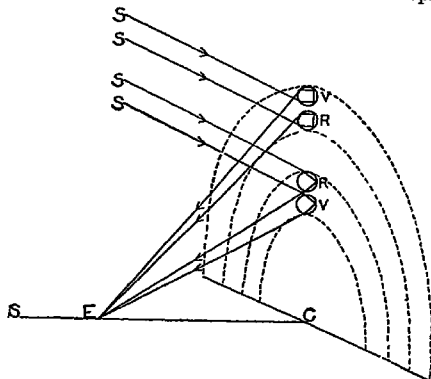
Winds carry water vapor a long distance, and when they blow inland, free from the obstruction of mountains near the coast, as in the valley of the Amazon, they cause rain to fall over extensive regions in the interior of a continent. At the equator, the average yearly rainfall is estimated at 95 inches. At a few isolated stations the fall is often very great. At Cherrapunjee, in the Khasia Hills of Assam, 615 inches of rain fall in the year, and there are several places in India with a fall of from 190 to 280 inches. The rainfall at New York is 43 inches; at Washington, 41 inches; at San Francisco, 22 inches; at Sitka, Alaska, 90 inches. The greatest rainfall on earth is in India—over 500 inches.

Related Articles. Consult the following titles for additional information:

Arid Region
Cloud
Desert
Dew
Dust, Atmospheric
Evaporation
Flood
Fog
Hail

Humidity
Irrigation
Meteorology
Physical Geography
Rainbow
Rain Gauge
Snow
Storms
Weather Bureau

RAINBOW, *rain'bo*, the arch of prismatic colors often seen in the heavens when the sun shines during a shower of rain. It is formed by the reflection and refraction of the sun's rays by the rain drops. These drops act like a prism and separate the rays into their prismatic colors (see *LIGHT*, subhead *Spectrum*). Each color is formed by rays that reach the eye at a given angle, and this angle never changes for the same color; hence, the bow appears circular. The observer, *E*, stands upon a line, *SC*, which, if projected, would pass through the center of the circle. The rays, *s s s s* are reflected and refracted differently in the upper and lower drops.



This gives rise to two bows, one within the other, with their colors reversed. In the inner and brighter bow, called the *primary*, the red is on the outside and the violet on the inside of the arch; in the outer and dimmer one, the *secondary*, the violet is on the outside and the red on the inside. The difference in brightness and the reverse of colors is caused by the various ways in which the drops reflect and refract the rays of light, as shown in the figure.

RAIN GAUGE, *gaj*, an instrument for measuring the depth of rainfall at any one time. The rain gauge in use by the United States Weather Bureau has two cylinders, one within the other. The inner cylinder, *B*, is attached to a funnel-shaped receiver, *C*, whose area is ten times the area of the cylin-

der A small opening at *D* allows the water to flow into the outer cylinder, *A*, should the amount of rain more than fill the small cylinder. The instrument is accompanied by a

rule, graduated in tenths of inches. A rainfall of one inch will give a depth of ten inches in *B*. Whenever the rainfall more than fills *B*, the water in the small cylinder is measured first, and recorded.

Then this is poured upon the ground and the water in *A* is poured into *B* and measured. The rainfall is one-tenth the number of inches in the two measures. The rain gauge should be so placed that it will be away from trees, buildings or other high objects so that the rain falling upon it will be neither more nor less than that falling upon an equal area in any part of the locality.

RAINIER, *ra neer'*, MOUNT, a mountain of volcanic origin, whose peak, 14,408 feet above sea level, is one of the highest in the United States. It is in Mount Rainier National Park, Washington. At the foot of the mountain is Nisqually Glacier, which forms part of one of the most extensive glacier systems in the world. The mountain is visited by thousands of tourists every year.

RAINY LAKE, a body of water forming part of the boundary between Minnesota and Ontario. It is about fifty miles long and of varying breadth. It receives the waters of numerous small lakes from the east and northeast, and discharges through Rainy River, about 100 miles long, into the Lake of the Woods.

RAISIN, *ra's'n*, RIVER, MASSACRE OF, a massacre committed during the War of 1812 at Frenchtown (now Monroe), Mich. General Winchester, under orders from General Harrison, took up a position on the Maumee River, and sent a detachment of Kentucky troops to drive the British from Frenchtown. After the successful attack he advanced into the village with his whole force. There he

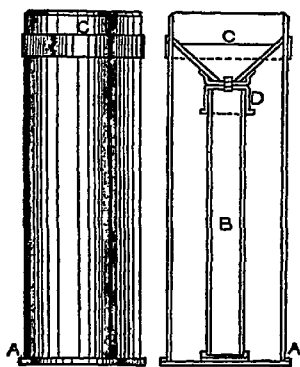
was surprised by a British and Indian force of 1,500 under Proctor, and he was forced to surrender. The British then withdrew to Fort Malden, taking with them the able-bodied prisoners and leaving the sick and wounded, to whom the Indians promised protection. Immediately after their departure the Indians fell upon those who were left behind, killing nearly four hundred. The cry, "Remember the River Raisin," was throughout the rest of the war a battle-cry to inspire among American troops feats of daring and revenge.

RAISINS, *ra's'nz*, grapes containing a large amount of sugar, dried by natural heat. The natural and best method is by cutting the stalks half through when the fruit is ripe, allowing the finest grapes to shrink and dry on the vine by the heat of the sun. Another method consists of plucking the grapes from the stalks, drying and dipping them in a boiling lye of wood ashes and quicklime, after which they are exposed to the sun upon hurdles of basket work. Those dried by the first method are called raisins of the sun, or *sun-raisins*, *muscatels*, or *blossoms*; those by the second, *lemas*. After drying, the raisins are stored in bins called "sweat boxes" until sorted, weighed and packed for shipping. The inferior sorts of grapes are dried in ovens.

Raisins are produced in large quantities in Southern Europe, in Egypt, in Asia Minor and in California. The finest table and cluster raisins come from Spain. A variety without seeds, from Turkey, is known as *sultanas*. The *Corinthian raisin*, or currant, is obtained from a small variety of grape peculiar to the Greek islands. See **GRAPE**.

RAJAH, *rah'jah*, in India, originally, a title which belonged to those princes of the Hindu race who, either as independent rulers or as feudal vassals, governed a territory, subsequently the title was bestowed by the native governments, and in later times it was given by the British government to Hindus of high rank. It is now not unfrequently assumed by the *zemindars*, or landholders, the title *maharajah* (great rajah) being in our day generally reserved to the more or less powerful native princes.

RAJPUTANA, *rahj poo tah'nah*, known officially as **RAJPUTANA AGENCY**, is a territory in India. It consists of twenty-one native states surrounding the British province of Ajmer-Merwara, and is situated in the



UNITED STATES RAIN GAUGE

western part of the country, south of the Punjab and west of the United Provinces of Agra and Oudh. The area is 128,987 square miles, in 1931 the population was 10,500,000. Most of the people are Hindus, but there are nearly a million Mohammedans.

Rajputana is intersected by the Aravalli Mountains, to the north of which the country is desert. The soil is remarkably saline, containing many salt springs and salt lakes, and much of the well water is brackish. To the south of the range the country is more fertile. The chief industry of the country is agriculture, and cereals and cottons are grown. The water supply is very uncertain, however, and famines are not infrequent. The government is administered by local officials who are responsible to the British government.

RALEIGH, *raw'ly*, N. C., the capital of the state and the county seat of Wake County, 148 miles northwest of Wilmington, on the Southern, the Seaboard Air Line and the Norfolk Southern railroads. The city is situated on an elevation of over 300 feet, in the upper valley of the Neuse River. The state capitol is a granite structure and occupies a prominent site on Union Square, near the center of the city. Other places of interest are the Confederate and National cemeteries, Pullen Park and the large state agricultural experiment farm. The educational institutions include the state college of agricultural and mechanic arts, Baptist University for Women, Peace Institute, Saint Mary's School, Saint Augustine Normal School and Collegiate Institute, and Shaw University. There are large state and supreme court libraries and the Raney Public Library. Some of the charitable institutions are the state asylum for the insane, the state institutions for the deaf, dumb and blind and two orphanages. Other prominent buildings are the governor's mansion, the state penitentiary, the supreme court building, the state geological museum, a Federal building, a fine courthouse and a municipal auditorium.

The city has an extensive trade in cotton, tobacco and general produce and contains a large spinning mill, gingham and other cotton goods factories, underwear and hosiery works, oil mills, fertilizer works, phosphate works, cigar factories, car works and various other industrial establishments. The site of the city was chosen for the capital in 1792, was laid out the same year and was named

in honor of Sir Walter Raleigh. The legislature first met here in 1794. The commission form of government was adopted in 1912. Population, 1920, 24,418; in 1930, 37,379, a gain of 53 per cent.

RALEIGH, *raw'li*, **WALTER**, Sir (about 1552-1618), an English navigator, warrior, statesman and writer, prominent in history chiefly as a courtier of Queen Elizabeth. He studied at Oxford, and at the age of seventeen joined a body of gentlemen volunteers, raised to assist the French Protestants. After this he engaged in buccaneering enterprises and served a year as captain in the Irish service. He then became a favorite at court and received appointments and grants which made him rich; according to tradition, this was because he threw his embroidered cloak into the mud, for Queen Elizabeth to walk over.



SIR WALTER
RALEIGH

In 1584 he obtained a charter of colonization and made repeated unsuccessful attempts to colonize Virginia. In the same year he obtained a large share of forfeited Irish estates, and introduced there the cultivation of the potato. In 1588 he rendered excellent service against the Spanish Armada, and subsequently fitted out vessels to attack the Spaniards. He also occupied a seat in Parliament.

To discover the fabled El Dorado, or region of gold, Raleigh planned an expedition to Guiana, on which he embarked in 1595. He reached the Orinoco, but was obliged to return after having done little more than take formal possession of the country in the name of Elizabeth. In 1596 he held a naval command against Spain, under Lord Howard and the Earl of Essex, and he assisted in the defeat of the Spanish fleet and the capture of Cadiz.

James I, on his accession in 1603, was prejudiced against Raleigh, whom he deprived of all his offices. Accused of complicity in Lord Cobham's treason against James, Raleigh was brought to trial in November, 1603, found guilty and sentenced to death. He was, however, reprieved and confined to the Tower. Here he remained for

twelve years, devoting himself to scientific and literary work and writing his *History of the World*, one of the most noteworthy contributions to Elizabethan literature. He also wrote philosophical and religious treatises. In 1616 he obtained his release by offering to open a mine of gold which he believed to exist near the Orinoco. The enterprise proved disastrous. Raleigh's force had attacked the Spaniards, and on his return James, to favor the Spanish court, determined to execute him on his former sentence. After a trial before a commission of the privy council, he was put to death.

RAMAYANA, *ra mah'yah nah*, an epic poem of India, written almost entirely by Valmiki, a poet who lived at the beginning of the Christian Era. The poem, one of the world's greatest epics, recounts the story of Prince Rama's successful combat with the king of demons, who dwelt in Lanka (probably Ceylon).

RAMEE, *ra may'*, LOUISA DE LA (1840-1908), an English novelist, better known under her pen name, OUIDA, the name by which she called herself as a small child in attempting to pronounce "Louisa." While her novels are cheaply sentimental and sensational, her children's stories, of which the best is *The Nuremberg Stove*, are well worth reading. *Under Two Flags*, *A Dog of Flanders*, *Two Little Wooden Shoes* and *Bambi* are among the stories that brought this author a considerable fortune.

RAMESES II, *ram'es sees*, (reigned from about 1340 to 1273 B. C.), was the most powerful of the twelve Egyptian kings called Rameses. He was very young when he came to the throne, and in the early part of his reign conquered Ethiopia and overthrew a confederacy of which the Hittites were head. At twenty-one he formed an alliance with the Hittites and married a daughter of their king. The latter part of his reign, which extended over sixty-seven years, was peaceful. Rameses erected many temples and several colossal statues of himself; his tomb at Ipsambul is one of the show places of Egypt. The mummy of the king, found in 1881, near Thebes, is in the museum at Cairo.

RAMIE. See BOEHMERIA

RANDOLPH, *ran'dolf*, EDMUND JENNINGS (1753-1813), an American statesman, born in Williamsburg, Va., and educated at William and Mary College. He identified himself with the patriot party, served for a

time on Washington's staff and in various political capacities in his native state, was a member of the Continental Congress in 1780 and became governor of Virginia in 1786. He was a conspicuous member of the Constitutional Convention and favored a strong central government, was opposed to numerous provisions of the Constitution and refused to sign it, but later advocated its ratification in Virginia. In 1789 he became first Attorney-General of the United States, and five years later he succeeded Jefferson as Secretary of State, but resigned in August, 1795, owing to political charges—later shown to be false—involving his honor. He was one of the foremost lawyers of his time and a brilliant orator and writer.

RANDOLPH, JOHN, "of Roanoke" (1773-1833), an American statesman, a native of Virginia and a direct descendant of Pocahontas. He was educated at Princeton and Columbia colleges and, after a brief period of law practice, was elected to Congress in 1799. In public life he was distinguished for eloquence, wit, invective and eccentricity. For thirty years he was more prominent than any other American



JOHN RANDOLPH

politician. He was the Democratic leader of the House of Representatives, but quarreled with Jefferson and opposed the War of 1812, he opposed also the Missouri Compromise and stigmatized its Northern supporters as "Doughfaces." He opposed Jackson on the nullification question. From 1825 to 1827 he sat in the Senate. While in the Senate Randolph characterized the coalition between Clay and Adams as a union of "the blackleg and the Puritan," and the result was a harmless duel with Clay. In 1830 he was appointed minister to Russia. By his will he freed his numerous slaves and provided for their settlement in a free colony.

RANGOON, BURMA, the capital and chief seaport of the province, is situated on the Rangoon River, about twenty-five miles from the sea. Since its occupancy by the British in 1852, Rangoon has undergone such changes

that it is practically a new town, and its population has increased fivefold. The principal streets are broad and contain many large buildings and not a few handsome ones. There are the law courts, the postoffices, the Bank of Bengal, the customhouse, the Anglican and Roman Catholic churches, Rangoon College and other buildings. A large and increasing commerce is carried on with British, Indian and Chinese ports; and an extensive trade is conducted with inland towns, as far as Mandalay. The chief exports are rice and teak, and the imports are mainly manufactured goods. A number of modern rice mills have been erected, and Rangoon is probably the greatest rice market in the world. There is a government dockyard. Population, 1931, 400,415

RANK, the degree of authority and dignity attached to the various officers of the army and navy. The commander in chief is usually the executive head of the nation and commands the entire national force. In the United States the President holds the title under the Constitution, but he exerts his power through his secretaries of war and navy. The general officers of the army commanding bodies larger than a regiment are, in order of rank, the lieutenant-general, who commands an army corps of a field army; a major-general, who commands a division, and a brigadier-general, who commands a brigade. Sometimes the title of general is bestowed to designate the military authority second only to that of the President. A regiment is commanded by a colonel aided by a lieutenant-colonel; a battalion by a major; a company by a captain, assisted by a first and a second lieutenant. Below the second lieutenant the officers are known as non-commissioned, or warrant, officers, and these are sergeants and corporals. They are appointed by the senior officer in command, and hold their positions at his pleasure.

Under the Secretary of the Navy, the highest grades are those of admiral and rear-admiral. A vice-admiral, when such a title is given, ranks second only to an admiral. Other commissioned officers are the captains of ships, commanders, lieutenant-commanders, lieutenants, and ensigns. Midshipmen graduates of the Naval Academy become ensigns upon assignment to the Navy. The rank of commodore in the American navy was abolished in 1905. The corresponding ranks in the army and navy are as follows:

ARMY	NAVY
General	Admiral
Lieutenant-General	Vice-Admiral
Major-General	Rear-Admiral
Brigadier-General	*Commodore
Colonel	Captain
Lieutenant-Colonel	Commander
Major	Lieutenant-Commander
Captain	Lieutenant
First-Lieutenant	Lieutenant (junior grade)
Second-Lieutenant	Ensign
*Not now commissioned.	

RANKE, *rahn'ke*, LEOPOLD VON (1795-1886), an eminent German historian, one of the founders of the modern historical school, which depends for its facts upon scientific investigation rather than on tradition. He studied in the University of Leipzig, became a teacher in the gymnasium of Frankfurt-on-the-Oder in 1818, and in 1825 accepted a professorship at the University of Berlin, where he remained until 1871. His first published work was a *History of the Romance and Teutonic Nations from 1494 to 1535*. This was followed by *Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries*; *History of the Popes*; *History of Germany in the Time of the Reformation*; *History of France, Chiefly in the Sixteenth and Seventeenth Centuries*; *History of England in the Seventeenth Century*, besides a number of other works. At the age of eighty he undertook with undiminished vigor to write a history of the world, and a volume of this great work appeared every year until his death. Ranke's style, though clear and easy to read, is dull and unentertaining.

RANKIN, JEANNETTE, (1880-), the first woman ever elected to the United States Congress. She was a member of the 65th Congress (1917-1919), the Republican representative-at-large for Montana, in the main a Democratic state. Her election from a state counting three men to every woman was considered not only a triumphant victory for the woman's suffrage cause but was a personal tribute to her from men who endorsed her beliefs respecting labor.

Miss Rankin was born on a ranch near Missoula, Mont., was graduated from the University of Montana in 1902, and has since been identified with social and suffrage work in almost every state in the Union. In New Zealand she worked as a seamstress to study personally social and economic conditions there. She directed the campaign



SISTINE MADONNA

This picture cannot be claimed by any nation or any creed; it belongs to the entire human race.
It is an immortal expression of the commonest, most beautiful of emotions.

which gave suffrage to the women of Montana in 1914. In 1919 she was one of the American delegates to the women's international conference which met in Europe to consider the peace treaty and other questions connected with the World War.

RANUNCULUS, the typical genus of the buttercup family. It includes hellebore, aconite, larkspur, anemone, columbine, peony, marsh marigold, clematis and numerous other familiar forms. These herbs, some annual, some perennials, are widely distributed throughout the temperate zones of both hemispheres. Some of them, being poisonous, are shunned by grazing animals and have multiplied rapidly. The commonest of the wild species in the meadows of the United States are *crowfoot*, *buttercup* and *spearwort*.

RAPHAEL SANTI, *rah'fa el sahn'te*, (1483-1520), one of the greatest painters that ever lived, often spoken of as the "Divine Raphael," was born at Urbino, Italy. His father was Giovanni Sanzio, a painter of some merit, from whom young Raphael received his first instruction. At the early age of twelve, he was received into the studio of Perugino at Perugia, as one of his pupils, and he continued with that celebrated painter for six or eight years. In 1504, after a period of study and work at Perugia, he visited his native town, and while there painted *Christ Praying on the Mount of Olives*, a *Saint Michael* and a *Saint George*; the last two are now in the Louvre. At about the same time he executed the *Marriage of the Virgin* (now in Milan) and several Madonnas, one of which is in the Metropolitan Museum, New York. Toward the end of the same year he proceeded to Florence, attracted thither by the fame of its numerous artists, and in this center of the highest artistic life of the time he studied diligently for a period of four years. In Florence he rapidly gained a wider knowledge of his art. He was profoundly influenced by the great painters there and by the sculptors Donatello and Ghiberti. In the course of his last two years in Florence he executed some



RAPHAEL

of his best known paintings, among them *The Entombment of Christ*, the *Madonna of the Grand Duke*, *Christ Bearing the Cross* and *The Marriage of the Virgin*.

In 1508 Raphael went to Rome, at the invitation of Pope Julius II, and began his work on the frescoes of the Vatican. After the accession of Pope Leo X, Raphael became the chief architect of Saint Peter's. At this time he also prepared designs for several palaces in Rome and other cities of Italy and finished the *Sistine Madonna*, the most celebrated picture in the world, for the Church of Saint Sixtus, Piacenza. It is now in the gallery at Dresden. To this period also belong his easel pieces, *Saint John in the Desert* and *Saint Cecilia*, and the circular composition known as the *Madonna of the Chair*. Raphael's last, and unfinished, painting, *The Transfiguration of Christ*, is in the Vatican.

Raphael has been called, and perhaps justly, the greatest of all religious painters. He combined sweetness with strength, grace and elegance with profound spiritual feeling, and his technical skill has never been surpassed. See MADONNA.

RAPPAHANNOCK, *rap a han'ok*, a river in Virginia, which rises in the Blue Ridge, flows southeast for 250 miles and enters Chesapeake Bay. It is navigable to Fredericksburg, 100 miles from its mouth. Here there is a fall which furnishes power for the operation of factories. The largest tributary is the Rappahan.

RASPBERRY, *ras'berry*, the fruit of a well-known shrubby plant, which is of the same genus as the blackberry. Several species are found growing wild in America and in Northern Europe and Asia. In the United States and Canada the common *red raspberry* is very abundant, especially in the Northern states and Southern Canada. It is a delicious fruit, but is not easily marketed, because it is so easily crushed and spoiled.

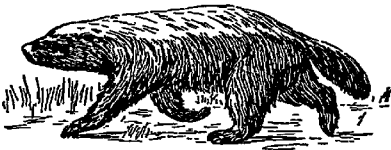
Strictly speaking, the raspberry is a tiny cap, a collection of cells each centered with a tiny seed, grouped around a receptacle, from which they part easily when the fruit is ripe. The three most familiar varieties are the European red raspberry and the native black and red raspberry. The black raspberry is smaller and less juicy than the red, but is finer in flavor. Both varieties are canned and cooked as jam. The raspberry crop in the United States is second only -

that of the strawberry, and in popularity it is almost its equal.

RAT, a common rodent mammal, a pest to mankind. The two most common species are the *Norway*, or *brown rat*, and the *black rat*. The brown rat, the larger and stronger, grows to about nine inches in length and is of a brownish color above and white below. Supposed to have been native to India and China, it became known in Europe about the middle of the eighteenth century; but it is now found in almost every part of the habitable globe. It is a voracious animal, swims readily in water and breeds four or five times in the year, each brood numbering about a dozen. The black rat is usually about seven inches in length, has a sharper head, larger ears and a much longer tail than the brown rat. It is also much less numerous and more timid. As rats are carriers of the bubonic plague (see **PLAGUE**), constant warfare is waged for their extermination, especially in the western ports of America, where vessels from Oriental countries are anchored.

RATCH'ET, a mechanism which limits the rotation of a wheel to one direction. It consists of a piece of metal, one end of which is attached to a pivot, the other so shaped and placed as to fit into the teeth of a wheel and prevent a backward motion. A *ratchet wheel* is a toothed wheel such as that which moves the carriage of a typewriter.

RA'TEL, a carnivorous animal of the badger family, found chiefly in the southern and eastern parts of Africa and in India. Its hair, unlike that of most animals, is light above and dark underneath. The *Cape*, or



RATEL

South African, ratel averages about three feet in length, including the tail. The fur is thick and coarse, black on the under parts, grayish on tail, upper surface, sides and neck. Ratels frequently raid the hives of wild bees and eat the honey, and because of this trick they are sometimes called *honey badgers*.

RATIO, *ra'she o*, or *ra'sho*, the numerical relation which two quantities of the same kind bear to each other. It is expressed as the

quotient obtained by dividing one quantity by the other. For example, 8 stands in the same relation to 16 as 2 to 4, and the ratio of the two groups, although they vary in quantity, is the same. See **PROPORTION**.

RATTAN, a large group of tropical palms, found chiefly in Borneo, where the most valuable are produced, also in Sumatra, Burma,



RATTAN

Malaysia and Ceylon. The long, slender, jointed stems are strong, flexible and durable and have a high commercial value. They are exported in large quantities to Europe and America, where they are used in the manufacture of furniture, baskets, umbrella handles and other articles. The fruit and the young shoots of some species are used by natives as food. See **PALM**; **CANE**.

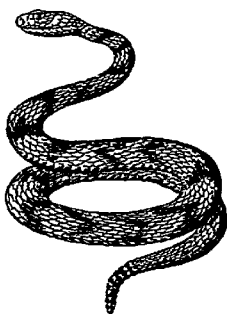
RATTLESNAKE, the name of various poisonous American snakes, distinguished from the other members of the family by a series of horny rings at the end of the tail, which the animal shakes in such a manner as to make a rattling sound. The rattlesnake is one of the most deadly of poisonous serpents. A number of species belong to the United States and Mexico. East of the Mississippi the *banded rattlesnake* is the best-known and most dreaded species. It is naturally a sluggish animal, ready to defend itself, but seldom commencing the attack. It feeds on rats, squirrels and small rabbits and reaches a length of five or six feet. The *striped rattlesnake* is found from Mexico to

Brazil; the *diamond rattlesnake*, sometimes eight feet long, greenish or golden-brown, marked on the back with diamond-shaped spots, is found in the swamps of the Southern states. The

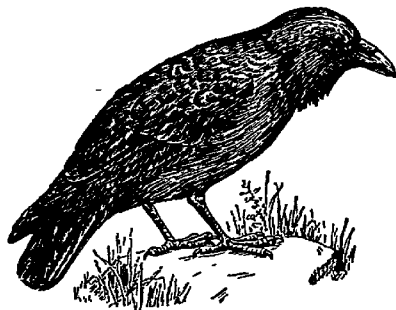
Western black rattlesnake, the *prairie rattlesnake*, the *horned rattlesnake* and various other species are scattered throughout the country. The venom in a rattlesnake's bite seems to vary with the season and with the individual attacked. Hogs and peccaries, which are

rendered immune by their thick hides and layers of fat, are not afraid of the reptiles, and often kill and eat them. The snakes feed on field mice and other small animals. See SNAKE.

RAVEN, a large bird of the crow family, whose plumage, beak and legs are jet black. Its remarkable appearance has in times past made the bird an object of veneration, awe or superstition, and it has figured conspicuously in literature. In Poe's poem, *The Raven*, the



RATTLESNAKE



RAVEN

bird, with its repeated utterance of the doleful word "nevermore," is symbolic of the utmost depression and melancholy. According to *Genesis*, Noah from the Ark sent out a raven—the first bird mentioned in the Bible. Many stories have been related of the bird's cleverness. Pliny told of a thirsty raven that raised water in a jug by dropping stones into it.

Ravens are found in every continent. Some adults have been known to attain a length of

twenty-six inches. They live in pairs and are said to mate for life—the average length of which is equal to man's. In early spring the rough nest is built, usually on a high cliff, and four or five greenish eggs, speckled with brown and black, are laid. Ravens are sometimes domesticated, because they can be taught, like the crows, to talk.

RAY, a large group of fishes, including the saw fish, devil fish, skate, string ray, shark ray and electric ray. Many members of the group are characterized by extreme flatness of the body and by winglike extensions on the sides. The rays are found in all seas. Some of the individuals measure ten feet in length. See SKATE.

RAYON. See SILK, ARTIFICIAL.

RE, or **RA**, *ray*, the greatest of Egyptian gods was the sun, represented by Re. He is identified to us in old sculptures as a man with a hawk's head, on which is a crownlike disk and serpent. In his hand is a scepter of authority. According to mythology, Re brought order to the world out of its primal chaos, later saved the gods and goddesses and all mankind as well when a rebellion threatened his power, and lived to a peaceful old age. His principal temple was at Heliopolis.

REACTION, *re ak'shun*, in chemistry, the name given to the changes that occur when two or more substances mixed together so act upon each other as to produce a new substance different from any of the substances uniting to form it. For instance, the oxygen of the air combines with wood or coal to form water, carbon dioxide and some other substances, leaving ash in the place of the wood or coal. When the process is rapid sufficient heat is produced to ignite the wood and cause fire. If oxygen and hydrogen are mixed in proper proportions in a closed vessel and ignited, they combine and form water. In chemistry reactions are expressed in the form of equations, as $2H + O = H_2O$, which means that two atoms of hydrogen are combined with one atom of oxygen to form a molecule of water. It will be noticed that the same number of atoms appears in each member of the equation. The study of chemistry is chiefly the study of reactions. See CHEMISTRY.

READ, *reed*, OPIC PERCIVAL (1852-), an American novelist and humorist. He was born at Nashville, Tenn., and after a brief school course began newspaper reporting at Franklin, Ky. Later he did newspaper work

in Ohio and Arkansas, and founded the humorous journal, *The Arkansas Traveler*. In 1891 he settled in Chicago. A list of his novels includes *Len Gansett*, *A Kentucky Colonel*, *A Tennessee Judge*, *A Yankee from the West*, *Old Ebenezer*, and *I Remember*.

READ, THOMAS BUCHANAN (1822-1872), an American painter and poet, born in Chester County, Pa. After a youth spent on his father's farm he went to Boston, and there, when he was about twenty, his verses began to appear in newspapers. In 1850 he went to Rome, where he studied art. He is best known for his stirring poem *Sheridan's Ride*, and for his verses entitled *Drifting*. Among his works are *Poems, Lays and Ballads*, *The New Pastoral* and *The House by the Sea*. His compilation *Female Poets of America* is illustrated with reproductions of portraits he painted.

READE, CHARLES (1814-1884), an English novelist and playwright. He was educated at Magdalen College, Oxford, and became dean of arts there. He studied law and for a time practiced in London. His first novel, *Peg Woffington*, was expanded from the play *Masks and Faces*, written in conjunction with Tom Taylor. This was followed by *Christie Johnstone* and *Never Too Late to Mend*, one of his "novels with a purpose," in which he attacked the English prison system. *Hard Cash* deals with the abuses practiced in insane asylums, and *Put Yourself in His Place* is an attack on the abuses of trade unionism. The best of his novels, *The Cloister and the Hearth*, has for its chief characters the parents of Erasmus. Reade, while not one of the greatest English novelists, is always entertaining.

READING. When a child has learned to read, he has come into possession of the key to all knowledge. The extent of his later reading and its quality determine to a considerable degree what manner of man he is to be.

The reading habit is instinctive; the minds of the boy and girl naturally reach out toward the unknown for facts which may be made their own and made to serve some purpose in their lives. Some like to read much better than do others; and this is due to more than one reason. The illiterate boy and the one with low ideals may have had no home encouragement in the direction of good literature and possibly even may have been discouraged in seeking it. His ideal is likely to

be the town bully, and his literature the lurid pages of the nickel novel. Let no one believe that such a boy reads nothing; the instinct for something from the printed page which he can unite to his own experience is alive in him as in the boy of other caliber.

Choice of Good Reading. Every boy and girl has a hero or a heroine—possibly many—and these are determined largely by their choice of reading. If one chooses the stories of King Arthur in early boyhood and reads them with pleasure, the lessons are going to be reflected in later years. It does no harm for the youthful mind to dwell upon the stirring plot of Jack the Giant Killer, for there is a high moral lesson which is sure to be learned and later remembered above the gory elements of the tale itself. Every intelligent parent knows the importance and difficulty, in these days of rapidly multiplying books and sensational newspapers, of making a wise selection of reading for the child in the home. It can be set down as almost an axiom that the boy and the girl for whom good books are provided will not of their own volition seek the worse books for themselves. The following books are suggested as worthwhile reading. Those of the first group are adapted to young people of the high school age and adults. Books for children are included in the second group.

Books for Young People and Adults. Fiction. *The Last of the Mohicans*, *The Spy* and *The Pilot*, by James Fenimore Cooper; *Uncle Tom's Cabin*, Harriet Beecher Stowe; *The Scarlet Letter* and *The House of the Seven Gables*, Nathaniel Hawthorne; *Lorna Doone*, R. D. Blackmore; *Last Days of Pompeii*, Bulwer-Lytton; *A Daughter of Ethel*, William Black; *The Rise of Silas Lapham*, W. D. Howells; *Hypatia*, Charles Kingsley; *Ivanhoe* and *The Heart of Midlothian*, Sir Walter Scott; *Romola*, George Eliot; *Oliver Twist* and *David Copperfield*, Charles Dickens; *The Vicar of Wakefield*, Oliver Goldsmith; *Henry Esmond* and *Vanity Fair*, William M. Thackeray.

Narrative Poems. *Evangeline* and *The Courtship of Miles Standish*, by Henry W. Longfellow; *Lars*, Bayard Taylor; *Enoch Arden*, Alfred Tennyson; *Snowbound*, John G. Whittier; *Marmion* and *Lady of the Lake*, Sir Walter Scott; *The Knights Tale*, Geoffrey Chaucer; *Paradise Lost*, John Milton.

Essays. *Dream Children* and *Dissertation upon Roast Pig*, by Charles Lamb; *Sir Roger*

de Coverley Papers from *The Spectator*, Joseph Addison; *My Study Fire*, Hamilton W. Mabie; *Birds and Bees* and *Wake Robin*, John Burroughs; *Dream Days*, Kenneth Grahame; *Essays in Idleness*, Agnes Repplier; *My Study Windows*, James Russell Lowell; *Virginibus Puerisque*, Robert Louis Stevenson; *The Autocrat of the Breakfast Table*, Oliver Wendell Holmes; *Crown of Wild Olives*, John Ruskin; *Self Reliance*, *Compensation* and *The American Scholar*, Ralph Waldo Emerson; *John Milton*, Joseph Addison and Warren Hastings, Thomas Babington Macaulay; *Of Nature in Men and Of Studies*, Sir Francis Bacon.

Lyric Poetry. (1) Miscellaneous Lyrics: *The Rainy Day*, by Henry W. Longfellow; *To a Waterfowl* and *The Wind and the Stream*, William Cullen Bryant; *To a Daisy* and *The Daffodils*, William Wordsworth; *To a Mouse*, *For a' That and a' That* and *Auld Lang Syne*, Robert Burns; *The Chambered Nautilus*, Oliver Wendell Holmes; *The Destruction of Sennacherib*, George Gordon Byron; *An Old Played-out Song*, James Whitcomb Riley; *Ode to a Skylark*, Percy Bysshe Shelley; *To a Dandelion*, James Russell Lowell; *Annabel Lee*, Edgar Allan Poe; *L'Allegro* and *Il Penseroso*, John Milton. (2) Elegies: *Elegy in a Country Churchyard*, Thomas Gray; *Threnodia*, James Russell Lowell; *In Memoriam*, Alfred Tennyson; *Lycidas*, John Milton; *Adonais*, Percy Bysshe Shelley. (3) Sonnets: *Victor and Vanquished* and *The Two Rivers*, Henry W. Longfellow; *On His Own Blindness*, John Milton; *Night*, Alfred Tennyson; *Reading*, James Russell Lowell; *When She Comes Home*, James Whitcomb Riley; *Composed on Westminster Bridge*, William Wordsworth.

Dramas. *She Stoops to Conquer*, by Oliver Goldsmith; *The Rivals*, Richard Brinsley Sheridan; *Richelieu*, Bulwer-Lytton; *Macbeth*, *Hamlet*, *Romeo and Juliet*, *The Tempest*, *Much Ado about Nothing*, *Comedy of Errors*, *Julius Caesar*, *Richard III* and *King Lear*, William Shakespeare.

Such a list cannot be considered as complete, but it is really suggestive. No one can read the works mentioned here without having brought to his attention a number of other masterpieces in each group. If, in reading, a person becomes interested in the works of any writer, his reading should not be limited to the titles suggested here, but should be pursued as long as it seems pleasing and

profitable and as time permits. In so reading, other writers will come into view, whose works deserve and should receive attention. The course of reading suggested, then, might be considered as a series of starting points for more extended reading.

Other departments of literature furnish different styles of reading which many will follow with interest and profit. Among the famous orations, for instance, are *The Scholar in a Republic* and *The Lost Arts*, by Wendell Phillips; *Reply to Hayne*, Daniel Webster; *On Conciliation with America*, Edmund Burke. Many of the great histories and biographies are real literature and may be read with the same genuine pleasure that fiction gives. Among the biographies should be included Franklin's *Autobiography*; *Life of Charlotte Brontë*, by Gaskell; *The Early History of Charles James Fox*, by Trevelyan; *La Salle*, by Parkman. *The Rise of the Dutch Republic*, by Motley, and *The Conquest of Mexico*, by Prescott are types of the finest literary history.

If a person should desire to undertake a rather wide range of reading, in chronological order, he may get a comprehensive knowledge of English and American literature in its different epochs by reading the following books, in the order given:

English. *The Prologue of the Canterbury Tales* and *The Knight's Tale*, Geoffrey Chaucer; the ballads of *Chevy Chase* and of *Robin Hood*; *Of Nature in Men*, *Of Expense*, *Of Studies* and other essays, Sir Francis Bacon; the first and third cantos of *The Faerie Queene*, Edmund Spenser; *Hamlet*, *Julius Caesar*, *Twelfth Night*, *The Tempest* and *Richard III*, William Shakespeare; *L'Allegro*, *Il Penseroso* and *Paradise Lost*, John Milton; *Robinson Crusoe*, Daniel Defoe; *Gulliver's Travels*, Dean Swift; *The Spectator*, Joseph Addison; *Essay on Man*, Alexander Pope; *On Conciliation with America*, Edmund Burke; *Clarissa Harlowe*, Samuel Richardson; *Tom Jones*, Henry Fielding; *Roderick Random*, Tobias Smollett; *Tristram Shandy*, Laurence Sterne; *She Stoops to Conquer*, *The Deserted Village* and *Vicar of Wakefield*, Oliver Goldsmith; *The Ancient Mariner*, Samuel Taylor Coleridge; *Tales from Shakespeare* and *Essays*, Charles Lamb; *The Lay of the Last Minstrel*, *Lady of the Lake*, *Ivanhoe*, *Heart of Midlothian*, *The Talisman* and *Old Mortality*, Sir Walter Scott; *The Dream*, *The Prisoner of Chillon*,

Destruction of Sennacherib and Childe Harold, George Gordon Byron; *Ode to the Skylark, The Cloud and Adonais*, Percy Bysshe Shelley; *Ode on a Grecian Urn and Ode to Autumn*, John Keats; *To a Daisy, The Solitary Reaper, The Daffodils, She Was a Phantom of Delight and Bereavement*, William Wordsworth; *Auld Lang Syne, Flow Gently Sweet Afton, Highland Mary, To Mary in Heaven and The Cotter's Saturday Night*, Robert Burns; *How Horatius Kept the Bridge, John Milton and Joseph Addison*, Thomas Babington Macaulay; *Heroes and Hero Worship*, Thomas Carlyle; *Sohrab and Rustum and Essays in Criticism*, Matthew Arnold; *Pendennis, Henry Esmond and Vanity Fair*, William M. Thackeray; *Adam Bede, Romola and Silas Marner*, George Eliot; *Last Days of Pompeii*, Bulwer-Lytton; *In Memoriam*, Alfred Tennyson; *Pippa Passes*, Robert Browning

American A chronological view of American literature should include the reading of such works as the following:

The Last of the Mohicans, The Pilot and The Spy, James Fenimore Cooper; *Thanatopsis and To a Waterfowl*, William Cullen Bryant; *The Sketch Book, Knickerbocker History of New York and The Alhambra*, Washington Irving; *The Raven, Annabel Lee, The Gold Bug and The Murders in the Rue Morgue*, Edgar Allan Poe; *The Scarlet Letter and The House of the Seven Gables*, Nathaniel Hawthorne; *Self Reliance, Compensation and The American Scholar*, Ralph Waldo Emerson; *Wild Apples, Walden and A Week on the Concord and Merrimac Rivers*, Henry D. Thoreau; *Uncle Tom's Cabin and Oldtown Folks*, Harriet Beecher Stowe; *Snowbound*, John G. Whittier; *The Psalm of Life, The Reaper and the Flowers, Resignation, The Courtship of Miles Standish, Evangeline and Hiawatha*, Henry W. Longfellow; *The Chambered Nautilus, Old Ironsides, The Deacon's Masterpiece, The Guardian Angel and The Autocrat of the Breakfast Table*, Oliver Wendell Holmes; *She Came and Went, The First Snowfall, Two Angels, The Vision of Sir Launfal*, Biglow Papers and *My Study Windows*, James Russell Lowell. No mention is made of recent writers or of current literature. The magazines and public press will keep one informed as to these.

Reading for Children. In city schools the course of study is well established and the

reading matter for every grade is carefully selected, so that teachers cannot well go astray. In the smaller graded schools and, in fact, in the district schools, the character and quantity of reading in each grade or class can easily be determined from courses of study or by following any one of the many excellent sets of modern readers. In most schools, too, more or less reading matter supplementary to the general course is available, and usually teachers have only to ask for more, in order to obtain it. The following list of supplementary works is intentionally brief, but yet it shows a course of reading which might be followed with profit in almost any school where no specific plans have been made for supplementary work.

If the teacher finds that a book is not adapted to being read aloud or is too simple or too difficult for the pupils for whom it was assigned, then she has only to go above or below in the list till she finds a book which is adapted to the individual. A child will enjoy listening to books which he cannot read to his own satisfaction until a year or more later. Moreover, children will listen time and again to the stories they like best and seemingly get more and more enjoyment out of them at each reading; so, it is not always necessary to have a great number of books for any grade, if the few that are on hand suit the tastes of the readers. The following list should be helpful to parents, also, in selecting the reading for their children, whose rank in school they know or may easily learn. None of the books mentioned are expensive, and most of them may be obtained in cheap form from the school-book publishing houses.

PRIMARY SCHOOLS *Social Science Readers*, Read; *Indian Life Readers*, Deming, *Happy Hour Books* (a series); *Cinder the Cat*, and *Shags the Milk Horse*, Huber; *Chimney Corner Stories*, Hutchinson; *Atlantic Treasury of Stories*, selections; *Poppy Seed Cakes*, Clark; *One Hundred Best Poems*, Barrows; *Dutch Twins*, Perkins; *Little Lame Prince*, Craik; *King of the Golden River*, Ruskin; *Magic Forest*, White; *Told Under the Blue Umbrella; Story of Doctor Dolittle*, Lofting; *Holiday Pond*, Patch; *Heidi*, Spyr.

INTERMEDIATE SCHOOLS. *Fairy Tales*, Andersen; *Alice in Wonderland*, Dodgson; *Jungle Book*, Kipling; *Wonderful Adventures of Nils*, Lagerlof; *Water Babies*, Kings-

ley; *Merry Adventures of Robin Hood*, Pyle; *Boys' King Arthur*, Lamer; *Story of Roland*, Baldwin; *Waterless Mountain*, Armer; *Hat-ty*, Field; *Wild Animals I Have Known*, Seton; *Hans Brinker*, Dodge; *Robinson Crusoe*, Defoe; *In the Days of Giants*, Brown; *Lance of Kanana*, French; *Treasure Island*, Stevenson; *Boy Knight of Reims*, Lounsberry; *In the Days of the Guilds*, Lamprey; *Singing Sword*, Hyde; *Adventures of Ulysses*, Colum; *Abe Lincoln Grows Up*, Sandburg; *Downright Dencey*, Suedeker; *Tangle-coated Horse*, Young.

JUNIOR HIGH SCHOOLS. *Prince and the Pauper* and *Tom Sawyer*, Clemens; *Men of Iron* and *Story of the Trail*, Pyle; *Deerslayer*, Cooper; *Jim Davis and Martin Hyde*, Masfield; *Bambi*, Salten; *Call of the Wild*, London; *Invincible Louise*, Meigs; *Six Feet Six*, James; *At the Sign of the Buffalo Skull*, Lamb; *Blacksmith of Vulno*, Kelly; *Smoky*, James; *Yesterday and Today*, Untermeyer; *Tales from Shakespeare*, Lamb; *Captains Courageous* and *Kim*, Kipling; *Roll Call of Honor*, Couch; *Sketch Book and Alhambra*, Irving; *Story of a Bad Boy*, Aldrich; *Mutineers*, Hawes; *Falcons of France*, Nordhoff; *Beethoven, Master Musician*, Goss; *On the Trail of Washington*, Hill; *Thomas Jefferson*, Lisitzky; *Little America*, Byrd; *Lorna Doone*, Blackmore; *Tale of Two Cities*, Dickens.

Study of Authors. The following suggestions for study will be helpful to teachers and parents who are endeavoring to cultivate in the young people under their charge good literary tastes.

The author selected for a typical study is the great American, Longfellow. If another is preferred, for a special program or other reason, the outline form given on Longfellow may be adapted to the altered need.

Henry Wadsworth Longfellow

The poems of Longfellow are possibly more generally studied than are those of any other writer. He addressed himself in many of his poems particularly to children and achieved the name of the "Children's Poet."

Biography. The following outline for the study of the life of Longfellow is offered as a model which can be used in studying the biography of any other writer. Its arrangement is such that it can be adapted to any changed conditions and can be studied by sections. Not all of the outlines below should

be offered to younger pupils; the teacher or parent must exercise proper judgment in determining to what extent the smaller boys and girls should be introduced to biography.

I. Early Life

1. Boyhood and youth
(See "My Lost Youth," also "Prelude" to "Voices of the Night")

2. Education

Portland Academy
Bowdoin College
Classmates
Poems

II. Professor in Bowdoin

1. Attempt to study law
2. Appointment at Bowdoin
3. Residence in Europe
4. College work
5. Marriage
6. Second trip to Europe
7. Death of Mrs Longfellow

III. Professor at Harvard

1. Residence in the Craigie House
2. Friendships
Felton, Cleveland, Sumner and Hawthorne
3. Work in the university
4. "Hyperion"
5. "Voices of the Night"
"Prelude," "Hymn to the Night," "A Psalm of Life," "The Reaper and the Flowers," "The Light of Stars," "Footsteps of Angels," "Flowers," "The Beleaguered City," and "Midnight Mass for the Dying Year"
6. Ballads
"The Skeleton in Armor"
"The Wreck of the Hesperus"
"The Village Blacksmith"
"Excelsior," and others
7. Poems on slavery
8. Third trip abroad
9. Second marriage
10. "The Spanish Student," and other poems
11. "Kavanagh"
12. "The Building of the Ship," and other poems

IV. Later Life

1. Retirement from Harvard
2. Important poems of this period
"Evangeline," "The Courtship of Miles Standish," "Hiawatha," "Tales of a Wayside Inn," and "Birds of Passage"
3. Celebration of Longfellow's seventy-second birthday
The presentation of the chair
Whittier's poem, "The Poet and the Children"
"From my Armchair"
4. Death, March 25, 1882
- V. Estimates of Longfellow as a Poet

The Study of Selections. In the study of literature selections, whether of poetry or prose, the teacher should observe the following points:

1. Be sure that the selection is adapted in thought and sentiment to the age and capacity of the class. Inexperienced teachers often make the mistake of using selections too difficult for the pupils.

2. See that the subject is such as will enable the pupils to grasp and enter into the spirit of the selection. (Note directions for the study of "The Village Blacksmith," below.)

3. Be sure that the pupils know the meaning of all words in the selection, and that they understand all the obscure and difficult passages.

4. If necessary, assist the pupils in forming mental pictures of the scenes and objects described.

5. Add such interesting items and information as you can obtain. For instance, pupils are always interested in the history of the selection studied. They like to know how Longfellow came to write "Children," "The Children's Hour," "The Village Blacksmith," and all poems in which they are interested. The teacher who can give information of this sort is always sure to have an interested class.

6. For the purpose of making practical application of our suggestions, we here give plans for the study of the poem "The Village Blacksmith."

THE VILLAGE BLACKSMITH

"The Village Blacksmith" first appeared in a volume of Longfellow's poems entitled "Ballads and Other Poems." The smithy alluded to was on Brattle Street, Cambridge, and was partially over-arched by a large chestnut tree. In his walks, Mr. Longfellow frequently saw the smith at work. Years afterward, the smithy was removed, a dwelling house was erected upon the site, and some of the branches of the tree were lopped off to make room for the house. This gave the tree such an unsightly appearance, that some months later it was ordered to be cut down by the village authorities. Most of the chips were carried away by the people of Cambridge as souvenirs. From the wood of this tree was made the chair which the children of Cambridge presented Mr. Longfellow on his seventy-second birthday.

THE VILLAGE BLACKSMITH

Under a spreading chestnut tree
The village smithy stands,
The smith, a mighty man is he,
With large and sinewy hands;

And the muscles of his brawny arms
Are strong as iron bands.

His hair is crisp, and black, and long,
His face is like the tan,
His brow is wet with honest sweat,
He earns what'er he can,
And looks the whole world in the face,
For he owes not any man.

Week in, week out, from morn till night,
You can hear his bellows blow,
You can hear him swing his heavy sledge,
With measured beat and slow,
Like a sexton ringing the village bell,
When the evening sun is low.

And children coming home from school
Look in at the open door,
They love to see the flaming forge,
And hear the bellows roar,
And catch the burning sparks that fly
Like chaff from a thrashing-floor

He goes on Sunday to the church,
And sits among his boys,
He hears the parson pray and preach,
He hears his daughter's voice,
Singing in the village choir,
And it makes his heart rejoice.

It sounds to him like her mother's voice,
Singing in Paradise!
He needs must think of her once more,
How in the grave she lies;
And with his hard, rough hand he wipes
A tear out of his eyes.

Tolling, rejoicing, sorrowing,
Onward through life he goes;
Each morning sees some task begun,
Each evening sees it close,
Something attempted, something done,
Has earned a night's repose.

Thanks, thanks to thee, my worthy friend,
For the lesson thou has taught!
Thus at the flaming forge of life
Our fortunes must be wrought;
Thus on its sounding anvil shaped
Each burning deed and thought.

Teacher's Preparation. 1. Make a careful study of the poem before presenting it to the class.

(a) Be sure you can explain by concrete illustrations the meaning of all terms used in the poem

(b) Separate the poem into parts, having each part contain a unit of thought or representation. There are four such divisions in "The Village Blacksmith."

(1) The smithy and the smith (Stanzas 1-3).

(2) The children at the smithy (Stanza 4).

(3) The smith at church (Stanzas 5-6).

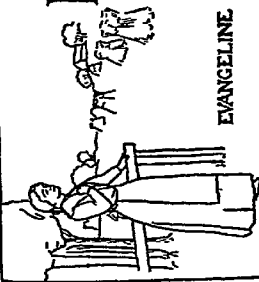
(4) Lessons drawn from the life of the smith (Stanzas 7-8).

(c) Learn the history of the poem and be prepared to tell it to the pupils

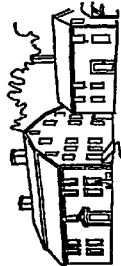
HENRY W. LONGFELLOW

1807

1882



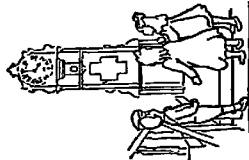
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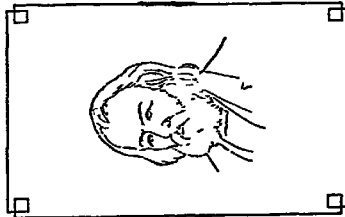
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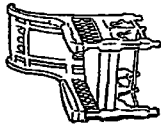
LISTEN MY CHILDREN
AND YOU SHALL HEAR
OF THE MIDNIGHT RIDE
OF PAUL REVERE



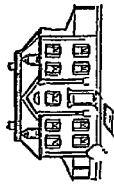
HALF WAY UP THE
STAIRS IT STANDS
AND POINTS AND
RECKONS WITH ITS
HANDS



LIVES OF GREAT MEN
ALL REMIND US
WE CAN MAKE OUR
LIVES SUBLIME



AND THUS DEAR CHILDREN,
YOU HAVE MADE FOR ME
THIS DAY A JUBILEE
AND TO MY MORE THAN THREE
SCORE YEARS AND TEN
BROUGHT BACK MY YOUTH
AGAIN



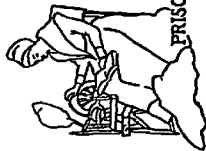
CRAIGE HOUSE



MINNEHAHA



MINNEHAHA FALLS



PRISCILLA

SEATED BESIDE HER WHEEL
AND THE CARDED WOOL
LIKE A SNOW-DRIFT
PILED AT HER FEET

SUGGESTED FOR BLACKBOARD OUTLINE

Presentation. 1. Tell the story of the poem—what led to writing it, and when it was written.

2. Study the poem by sections with the class. The first study will include the first three stanzas.

3. Select the words whose meaning the pupils may not understand.

4. Select the objects named in the picture which the pupils may not have seen. To some city pupils the smithy and the chestnut tree will be strange objects. The bellows and the sledge may also be unfamiliar. *Sexton* may also need attention.

5. Have the pupils describe the picture. The description must include a description of the chestnut tree, the smithy and the smith.

Recitation. 1. Have the class read the first stanza.

2. Watch for faulty expression. This indicates lack of comprehension.

3. Read the second and third stanzas.

4. Call upon the different members to read the three stanzas. This will reveal their degree of comprehension of the division studied.

Other Sections. The second and third divisions can probably be taken at one lesson. The scene in the smithy will need explanation to the children who have not seen a forge. The flame is small and the roar of the bellows is the sound made by the current of air forced through the fire. The pupils may not know what chaff is. Be sure that the children get a correct mental picture of the smithy.

The fourth and fifth stanzas need but little explanation. The chief thought to bring out is that beneath a rough exterior the smith carries a kind and loving heart.

The last division should be taken at one lesson. The first stanza teaches the lesson of industry and shows the satisfaction arising from completing one's task. The last stanza refers to the lesson which the smith's life teaches, and compares his work at the forge with work of each individual in shaping his character. This poem is usually read before the pupils can fully grasp the thoughts in this stanza, yet they will get some comprehension of them. It is well to carry the study only so far as they can readily follow it.

Review. 1. After the entire poem has been studied according to this plan, have the members of the class read it. Each member should read the entire poem.

2. Have the class memorize the poem.

PAUL REVERE'S RIDE

"Paul Revere's Ride" was written in 1860 or 1861, and constitutes the landlord's tale in the first series of "Tales of a Wayside Inn," published in 1863. This volume comprises a collection of short poems, and the author presents them as though they were told by a number of friends who occasionally meet at the Old Howe Tavern in Sudbury, Massachusetts. This tavern was known as the "Wayside Inn," and is still standing. In the introduction to the poem, the poet describes the friends who are accustomed to gather around the fireside. The musician, who is characterized as "The Angel with the Violin," was the celebrated Ole Bull. The Sicilian was Professor Luige Monti, a celebrated scholar and lecturer. The theologian was Reverend Samuel Longfellow, the poet's brother, and the poet was Thomas William Parsons.

The appearance of this strong, patriotic poem just before the breaking out of the Civil War was not a mere coincidence. In "Paul Revere's Ride," as in "The Building of the Ship," Longfellow seizes on a common incident for the purpose of teaching a memorable lesson in patriotism. The teacher who fails to lead her pupils to realize this lesson fails to reach the climax of the poem.

PAUL REVERE'S RIDE

Listen, my children, and you shall hear
Of the midnight ride of Paul Revere,
On the eighteenth of April, in seventy-five;
Hardly a man is now alive
Who remembers that famous day and year.
He said to his friend, "If the British march
By land or sea from the town tonight,
Hang a lantern aloft in the belfry arch
Of the North Church tower as a signal light—
One, if by land, and two, if by sea,
And I on the opposite shore will be,
Ready to ride and spread the alarm
Through every Middlesex village and farm
For the country folk to be up and to arm."

Then he said "Good-night!" and with muffled oar
Silently rowed to the Charlestown shore,
Just as the moon rose over the bay,
Where swinging wide at her mooring lay
The Somerset, British man-of-war;
A phantom ship, with each mast and spar
Across the moon like a prison bar,
And a huge black hulk, that was magnified
By its own reflection in the tide

Meanwhile, his friend, through alley and street,
Wanders and watches with eager ears,
Till in the silence around him he hears

The muster of men at the barrack door,
The sound of arms, and the tramp of feet,
And the measured tread of the grenadiers,
Marching down to their boats on the shore.

Then he climbed the tower of the Old North
Church,

By wooden stairs, with stealthy tread,
To the belfry-chamber overhead,
And startled the pigeons from their perch
On the somber rafters, that round him made
Masses and moving shapes of shade—
By the trembling ladder, steep and tall,
To the highest window in the wall,
Where he paused to listen and look down
A moment on the roofs of the town,
And the moonlight flowing over it.

Beneath, in the churchyard, lay the dead,
In their night-encampment on the hill,
Wrapped in silence so deep and still
That he could hear, like a sentinel's tread,
The watchful night-wind, as it went
Creeping along from tent to tent,
And seeming to whisper, "All is well!"
A moment only he feels the spell
Of the place and the hour, and the secret
dread

Of the lonely belfry and the dead;
For suddenly all his thoughts are bent
On a shadowy something far away,
Where the river widens to meet the bay—
A line of black that bends and floats
On the rising tide, like a bridge of boats.

Meanwhile, impatient to mount and ride,
Booted and spurred, with a heavy stride
On the opposite shore walked Paul Revere.
Now he patted his horse's side,
Now gazed at the landscape far and near,
Then, impetuous stamped the earth,
And turned and tightened his saddle-girth;
But mostly he watched with eager search
The belfry-tower of the Old North Church,
As it rose above the graves on the hill,
Lonely and spectral and somber and still
And lo! as he looks, on the belfry's height
A glimmer, and then a gleam of light!
He springs to the saddle, the bridle he turns,
But lingers and gazes, till full on his sight
A second lamp in the belfry burns

A hurry of hoofs in a village street,
A shape in the moonlight, a bulk in the dark,
And beneath, from the pebbles, in passing, a
spark

Struck out by a steed flying fearless and fleet,
That was all! And yet, through the gloom and
the light,

The fate of a nation was riding that night,
And the spark struck out by that steed, in his
flight,

Kindled the land into flame with its heat.
He has left the village and mounted the steep,
And beneath him, tranquil and broad and
deep,

Is the Mystic, meeting the ocean tides;
"And under the alders, that skirt its edge,
Now soft on the sand, now loud on the ledge,
Is heard the tramp of his steed as he rides

It was twelve by the village clock
When he crossed the bridge into Medford
town

He heard the crowing of the cock,
And the barking of the farmer's dog,
And felt the damp of the river's fog,
That rises after the sun goes down.

It was one by the village clock
When he galloped into Lexington
He saw the gilded weathercock
Swim in the moonlight as he passed,
And the meeting-house windows, blank and
bare,
Gaze at him with a spectral glare,
As if they already stood aghast
At the bloody work they would look upon

It was two by the village clock,
When he came to the bridge in Concord town
He heard the bleating of the flock,
And the twitter of birds among the trees,
And felt the breath of the morning breeze
Blowing over the meadows brown
And one was safe and asleep in his bed
Who at the bridge would be first to fall,
Who that day would be lying dead,
Pierced by a British musket-ball.

You know the rest In the books you have
read,

How the British Regulars fired and fled—
How the farmers gave them ball for ball,
From behind each fence and farm-yard wall,
Chasing the red-coats down the lane,
Then crossing the fields to emerge again
Under the trees at the turn of the road,
And only pausing to fire and load

So through the night rode Paul Revere;
And so through the night went his cry of
alarm

To every Middlesex village and farm—
A cry of defiance and not of fear,
A voice in the darkness, a knock at the door
And a word that shall echo forevermore!
For, borne on the night-wind of the Past,
Through all our history, to the last,
In the hour of darkness and peril and need,
The people will waken and listen to hear
The hurrying hoof-beats of that steed
And the midnight message of Paul Revere

Teacher's Preparation. 1. Become thoroughly familiar with the historical events.

2. By a careful study of the map of Boston and vicinity, obtain a clear idea of the geography of the locality. You should be able to draw the map and trace Revere's route upon it.

3. Study the poem for the purpose of dividing it into suitable sections. You will discover four divisions, to each of which one or more lessons should be devoted. These are:

(a) The introduction, lines 1-23.

(b) The movements of the friend, lines 24-56.

- (c) The ride, lines 57-110.
 (d) The conclusion, lines 111-130.
4. Make a thorough study of each division.
- (a) Determine how it should be divided for the purpose of enabling the pupils to see the pictures brought out and to understand the thought expressed.
- (b) Become familiar with all allusions and terms which the pupils will not readily understand; as *belfry arch*, line 8; *Middlesex*, line 13; and *muffled oar*, line 15.
- (c) Select the rhetorical figures, and be prepared to explain those that the pupils may not understand; as *across the moon like a prison bar*, line 21; *eager ears*, line 25; *night encampment*, line 43; and *like a sentinel's tread*, line 45.
- (d) Be sure that you comprehend the thought in the author's comments which he now and then introduces into the story. For instance, what does he mean by the line, "The fate of a nation was riding that night"? How will you explain the following lines?

"And the spark struck out by that
 steed, in his flight

Kindled the land into flame with
 its heat."

The last twelve lines of the poem will require special study for the purpose of determining their meaning.

Presentation. 1. *The General Idea.* Pupils sufficiently mature to study this poem to advantage are able to read it through to themselves, and in this, to get a general idea of it. This should be the first step.

2. *The Setting.* The setting includes the time, place, conditions and persons engaged. The time is at the breaking out of the Revolutionary War, and the pupils must become enthusiastic over the colonists' struggle for liberty if they are properly to appreciate the poem. The geography of the locality should be studied as already indicated. The conditions in and about Boston must be realized. Pupils should be led to see the effect upon the citizens of Boston of the presence of a British army in their midst. They should also realize the meaning underlying the colonists' determination to resist by force of arms, if necessary, any further encroachment on the part of the British. Persons in the poem in whom

we are directly interested are Paul Revere and his friend. Revere was a silversmith and a patriot, and was active in resisting the encroachment of the British. We do not know the friend's name.

3. Answer satisfactorily to yourself the following questions:

Why was it necessary for Revere to know
 by which route the British marched?
 How long a ride did Revere take?
 In what part of Boston was the Old North
 Church?
 Is it still standing?

Answers to these and similar questions, which occur to any teacher, show something of the knowledge necessary to give the poem a suitable setting.

A knowledge of the facts mentioned is essential to the underlying study of the poem. There are also many other facts, a knowledge of which will add interest to the study, but this knowledge is not essential to the understanding of the main thought of the narrative. Among these facts are the manner in which the rider was dressed, the sort of saddle and bridle on his horse, the location of the British camp in Boston, the difference in equipment of the American and British forces, and so on. The teacher should enter into details as far as the time devoted to the study and the ability of the class to understand them will make it profitable to do so. Many of the facts can be discovered by the pupils themselves, but the teacher should be able to narrate them in a vivacious and interesting manner. The study of these features should not, however, be allowed to overshadow the thought and beauty of the poem. Neither should all these facts be presented at once. After the general introduction, in which the leading historical and geographical facts are brought out, the others should be taken up as the study of the poem leads to them.

Recitation. 1. At the first lesson, take up the features of the general setting, as already explained.

2. Prepare the class for reading the first division, lines 1-23, at the next recitation. This preparation should consist of directions for studying this part of the poem. Give attention to words whose meaning the pupils may need to look up. If they have no means of ascertaining the meaning, give it to them at once. Give special attention to passages which will require careful study, such as that referring to the phantom ship, lines 20-23

3. The second recitation should be devoted to the discussion and reading of the first section.

(a) Question the class on the meaning of the words they were required to look up.

(b) Ask the members to give their ideas of the difficult passages. How many can see "the huge black hulk, that was magnified by its own reflection in the tide"? How many can tell why it was necessary for Revere to know the route by which the troops were to march? How many can locate the Old North Church and Paul Revere on the opposite side of the river? The purpose of these questions should be to clear up all doubtful points and thus remove all obstruction to expression.

(c) Have the pupils read that part of the poem under discussion. Watch for faulty expression or hesitation, because they usually indicate failure to comprehend the thought. Pupils who understand the division should read as easily and as naturally as they would converse with their companions.

4 In the following recitations the other divisions should be treated in the same manner. If the work in the first two lessons is thoroughly done, the remainder of the poem can be read in two lessons. The younger pupils will not be able to comprehend fully the meaning brought out in the fourth division, lines 111-130, but they can grasp enough of it to enable them to understand that the purpose of the poem was to arouse the spirit of patriotism. In connection with this poem the pupils should read Emerson's "Concord Hymn."

Review. After the entire poem has been studied in this way, one or two recitations should be devoted to reading it as a whole. It will be wise, however, to defer this review until the pupils have studied one or more selections on other subjects.

Summary. We have herewith given complete plans for the study of two poems. These plans can readily be applied to the study of any literary selections suitable to the pupils of this grade. If the pupils are older, they should make a more detailed study of the selection, and the finer shades of meaning should be brought out. The main features of

these plans are common to the study of all selections. The minor features must be determined by the teacher from the character of each selection. The underlying principle is, *Comprehension of thought must precede expression of thought.* Therefore, before oral reading is attempted, all obscure meaning must be made plain. Much of the faulty expression in oral reading is due to the fact that pupils are called upon to read selections which they do not understand.

Interesting Facts about Authors.

Longfellow

William Longfellow, from whom the family in America descended, came to Massachusetts in 1651 and settled in Newbury.

The poet's paternal grandfather was prominent in law and politics. He represented his town in the General Court of Massachusetts for eight years, was several years Senator from Cumberland County, and for fourteen years was judge of the Court of Common Pleas.

Longfellow's father was a leading lawyer of Portland. He held many offices of trust in his city and county, and was a member of the Eighteenth Congress.

On his mother's side, the poet was a descendant of John Alden, who came over in the "Mayflower" and whose wife, Priscilla, Longfellow immortalized in his "Courtship of Miles Standish."

Longfellow's early education was obtained in a private school and at the Portland Academy, where he prepared for college. In the poem "My Lost Youth" he gives a description of Portland and the surrounding country as they were at that time.

Longfellow's first published poem, "Love-well's Fight," appeared in the "Portland Gazette" when he was fourteen.

Longfellow entered Bowdoin College with his brother Stephen in 1821. Among his classmates were John S. C. Abbott, the historian, and Nathaniel Hawthorne, who became one of the most distinguished American men of letters.

Longfellow's college life was uneventful. His charming manner and studious habits made him a favorite alike with students and instructors. While in college he wrote a number of poems, which were first published in the "United States Literary Gazette." From this journal they were copied by other papers, and thus received a general circula-

tion throughout the country. Only seven of these poems were included in later editions of the author's works.

Longfellow's father intended that he should be a lawyer, but a year's trial in his father's office convinced the young poet that he would never succeed in the legal profession. About this time he was chosen Professor of Modern Languages in Bowdoin College and his life work began.

The origin of some of Longfellow's most popular poems is of special interest. "The Psalm of Life" was written on a bright summer morning, as the poet sat at a small table, it is said, looking out over the landscape. "The Wreck of the Hesperus" was written by chance, after a violent storm. The story came into his mind in the evening. He went to bed, but could not sleep, so he arose and wrote the poem. "Excelsior" was suggested by his seeing that word upon a scrap of paper which he picked up on the street. He took from his pocket a letter which he had just received from Charles Sumner, and sitting upon the curbstone, wrote the poem on the back of the letter. The story on which "Evangeline" is founded was given to him by Hawthorne, who had received the facts from a friend. This friend thought Hawthorne could write an excellent novel on the incident, but he did not see anything in it for a story, so he gave it to Longfellow.

Bryant

Bryant came of sturdy New England stock. His mother was a descendant of John and Priscilla Alden, and his earliest American ancestor on his father's side is said to have come to America in the *Mayflower*. Bryant's father, his grandfather and his great-grandfather were all New England country doctors.

Bryant was a precocious child. He was sent to school when three years of age, and could read well at four. When only thirteen he published a volume of poems which had two editions.

The circumstances attending the publication of "Thanatopsis" are interesting. His father happened to find this poem in his son's desk. He copied it, took it to Boston and gave it to Mr. Willard Phillips, the editor of the "North American Review." The verses were shown to Richard H. Dana, who exclaimed, "You have been imposed upon; no one this side of the Atlantic is capable of writing such verses." Mr. Phillips thought

that the father wrote them, but when the truth was known Bryant was invited to contribute regularly to the "Review."

After he became editor of the "New York Evening Post" Bryant took much interest in politics and warmly supported Lincoln. Though habitually dignified and self-controlled, he had a quick temper. Once he met a political adversary on the street and gave him a thrashing. The poet never ceased to regret that failure to preserve his dignity. His connection with the "Evening Post" lasted over fifty years.

Bryant is often thought of as grave and lacking in humor, but he had a quiet enjoyment of fun. A letter written to his mother about his marriage is interesting. It states that the ceremony included the muttering of certain cabalistic expressions which he was too frightened to recollect. He also says that he did not look for good qualities in his wife, but they trapped him before he was aware. He concludes, "And now I am married in spite of myself."

Bryant's life extended from the administration of Washington to that of Hayes, and for more than fifty years he exerted a strong influence on the development of the nation. He entered fully into the life of the country's metropolis as editor, orator and public man. So varied, indeed, were his duties that he had but little time to devote to writing poetry, but what he did write shows his supremacy in his own field. He was America's first great nature poet, writing of the bobolink, the fringed gentian, lakes and mountains.

He continued his editorial work until the last year of his life, and to the end was prominently identified with all worthy movements to further the progress of the arts and literature. When in his eighty-fourth year, he delivered an oration at the unveiling of the statue of Mazzini in Central Park. Exhausted by the effort and by the heat of the day, he fell on reaching home, and died two weeks later.

Bryant's life was unique. He saw American literature develop from infancy to maturity and his nation expand into a mighty power. No American represents more fully than Bryant the ideals and history of the American people.

Tennyson

Tennyson's first volume of poems was published by himself and his brother Charles.

Both boys contributed to its contents, and it is difficult to tell which one wrote the various poems. The volume appeared when Tennyson was seventeen.

Tennyson was a general favorite in college and formed many friendships. His closest friend was Arthur Hallam, son of the historian. Hallam died soon after leaving college. "In Memoriam" is Tennyson's immortal monument to his friend.

The general recognition of Tennyson as the greatest poet of his time dates from the publication of his famous volume in 1842. Among the poems in this volume were "The Talking Oak," "Dora," "Locksley Hall" and "Sir Galahad."

In 1893 Tennyson was offered the peerage by Queen Victoria, and was designated Baron of Aldworth and Faringford, January 18, 1894. Thereafter he was known as Lord Tennyson.

"Locksley Hall" was published in 1842. In 1886 appeared "Locksley Hall Sixty Years After," written when the poet was in his seventy-eighth year; yet the latter poem shows no lack of mental vigor.

Tennyson died October 7, 1892, and was buried in the "Poet's Corner" of Westminster Abbey.

Whittier

Until he was a young man, Whittier lived and worked on a farm. This was before farm machinery had been invented, and all work was performed by hand labor with the simplest tools. To his early training is undoubtedly due Whittier's sympathy with all forms of common labor. His interest in the lives of the working people of his time is shown in the series of poems known as "Songs of Labor." "The Shoemakers" and "The Huskers" are two of the best-known poems of this series.

The old farmhouse near Haverhill, Massachusetts, in which Whittier was born, and which he described in "Snow-Bound," was built in 1688. It is still standing, and with its furniture is carefully preserved. Many of the rooms are open to visitors.

When Whittier was fourteen, the schoolmaster whom he describes in "Snow-Bound" brought to his home a volume of Burns' poems. In reading this, the boy obtained much inspiration. The book influenced all of his life and many of his poems. In his poem "Burns," he speaks of this influence.

"O'er rank and pomp, as he had seen,
I saw the man uprising;
No longer common or unclean,
The child of God's baptizing!
With clearer eyes I saw the worth
Of life among the lowly;
The Bible at his Cotter's hearth
Had made my own more holy."

Whittier's first slavery poem was published in the local paper when he was eighteen. The lines attracted the attention of William Lloyd Garrison, who was then but twenty. He went to the Whittier homestead and urged Whittier's father to give him an education. To his plea the father replied, "Sir, poetry will not give him bread." Whittier's schooling was limited, being confined to attendance at the common school in his district, and two terms at the Haverhill Academy.

He began his literary labors as the hired editor on the "American Manufacturer," though while attending the academy he wrote nearly one hundred poems, many of which appeared in the "Haverhill Gazette."

Whittier early became interested in politics, and when a young man was favorably considered for a congressman. His love for liberty, however, caused him to join the Abolitionists, and this ended his career in every party which at that time was laboring to succeed at the polls.

He was one of the leaders in the movement to abolish slavery, and did much by his writings and influence to accomplish this result. Whittier was a friend and admirer of Charles Sumner, and was largely instrumental in securing his election to the Senate.

"Barbara Frietchie," considered to be one of the best ballads of the Civil War, was written in 1863. There has been a good deal of controversy as to whether or not the ballad was founded on fact. Whittier said that the poem conformed strictly to the incident as he learned it from trustworthy sources. Barbara Frietchie was a gentlewoman highly esteemed in the community in which she lived. She was a staunch Unionist, and it is said that when the Confederates entered her yard, she denounced them and shook her cane in their faces, and drove them out. It was also stated that May Quantrelle, a lady living in another part of the city, did wave the Union flag at the Confederate forces. In the narrative as it reached Whittier, the incidents were probably confused.

Notwithstanding his power as an anti-slavery advocate, Whittier lived a quiet, retired life. When he left the farm, he removed to a smaller house near Amesbury, Massachusetts, where he lived during the most of his life. He died at Hampton Falls, New Hampshire, September 7, 1892

Holmes

Holmes was a cousin of Wendell Phillips, and a direct descendant of Anne Bradstreet, the first American poetess. The Dorothy Q described in his poem of that name was Dorothy Quincy, his great-grandmother.

The deacon who built the "one-hoss shay" was David Holmes, the poet's grandfather. He was a captain in the French and Indian War, and a surgeon in the Revolutionary War.

"Old Ironsides," one of the most famous of Holmes's poems, was written in 1830, and was inspired by the order of the Secretary of the Navy to destroy the frigate "Constitution." Holmes read the order in a newspaper, and on a scrap of paper with a lead pencil he wrote the stanzas at once, and sent them to the "Boston Daily Advertiser." The poem was copied by the press throughout the country, and was even printed on handbills and circulated about the streets of Washington. It created such widespread indignation that the Secretary countermanded this order, and the old ship still floats. This poem was written when Holmes was a law student and only twenty-one years of age. This is probably the only instance in history where the verses of a law student reversed the policy of the government. His "Plea for the Old South" performed a somewhat similar service.

Holmes graduated from Harvard College in 1829. Among his classmates were a number of men who gained a world-wide or national reputation in their respective callings. In his poem "The Boys," written for the class reunion of 1859, he refers in a pleasant way to some of these distinguished classmates. The "judge" of the poem was George T. Bigelow, Chief-Justice of Massachusetts. The "boy with the three-decker brain," was B. R. Curtis, a justice of the Supreme Court of the United States. The "boy with the grave mathematical look," was Professor Benjamin Peirce of Harvard, one of the most celebrated mathematicians of his time. James Freeman Clarke and Reverend Samuel Smith,

the author of "America," were also members of this class.

We often hear Boston referred to as the "Hub of the Universe," but we seldom ascribe the origin of this expression to Holmes. In his "Autocrat of the Breakfast Table," he makes one of his characters say, "Boston State House is the hub of the solar system. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar."

Holmes also was the originator of the name of the "Atlantic Monthly." When it was decided to start this periodical the editorship was offered to James Russell Lowell, who consented to accept the position only on condition that Holmes should be secured as a regular contributor. To this Holmes replied, "You see, the doctor is like a bright mountain stream that has been dammed up among the hills, and is waiting for an outlet into the Atlantic." From this incident the periodical took its name.

Holmes' fame is not confined to the realms of literature. He was for thirty-five years Professor of Physiology and Anatomy in Harvard College, and was one of the leading medical authorities of his day. It was due to him that the microscope was introduced into medical practice in the United States.

Lowell

Lowell came of a family distinguished in many fields of activity. His father, grandfather and great-grandfather were graduates of Harvard College; his father was pastor of the First Church in Boston. His grandfather, John Lowell, as a member of the Constitutional Convention of Massachusetts, introduced into the Bill of Rights of the state a clause abolishing slavery.

An uncle of the poet, Francis Cabot Lowell, was a successful manufacturer, and the city of Lowell was named for him. Another uncle founded the Lowell Institute in Boston.

One of Lowell's ancestors on his mother's side was a signer of the Declaration of Independence.

During his college life, Lowell came in contact with many distinguished men of letters. Among his teachers were Benjamin Peirce, the mathematician of Holmes's "famous Class of '29," and Longfellow. Lowell himself tells us that he read, while in college, "almost everything except the text-books prescribed by the faculty." During his senior year he

became so indifferent to college regulations that the faculty requested that he study for a time at Concord, under a tutor. It was here that he met Emerson, of whom he later became an ardent admirer. It was also at this time that he first felt the stirrings of his anti-slavery convictions.

Lowell was married in 1844 to a sister of one of his classmates, Maria White. She was a noble woman of lofty poetic genius, and by her inspiration she greatly influenced her gifted husband. Some of the most touchingly beautiful of Lowell's poems were written about his wife and children. "The Changing" and "She Came and Went" were written in commemoration of his first child, Blanche, who died when two years of age. His poem which all children know and love is "The First Snowfall." In this he speaks of his second little daughter, Mabel, and of her sister "folded close under deepening snow." When he sent this poem to the periodical in which it was published, Lowell wrote, "Print that as if you loved it. Let not a comma be blundered * * * May you never have the key which shall unlock the whole meaning of the poem to you."

"The Burial" in part was written after the death of Lowell's third daughter, Rose, who lived only a few months. Into it is interwoven the memory of his oldest child, especially in the last stanza, where he speaks of the little shoe in the corner. One of Lowell's biographers mentions that after Blanche was buried, her father took her tiny shoes, the only ones she had ever worn, and hung them in his chamber. There they stayed till his own death. Of his wife's death he says, "Something broke my life in two, and I cannot piece it together again."

Lowell was essentially a nature poet. In the famous "Prelude to Part Second" in his "Vision of Sir Launfal" he describes a scene which he himself enjoyed. In one of his letters he tells of a walk he took to Watertown over the snow in the moonlight. In his own words, "Orion was rising behind me, and as I stood on the hill just before you enter the village, the stillness of the fields around me was delicious, broken only by the tinkle of a little brook which runs too swiftly for frost to catch it. My picture of the brook in 'Sir Launfal' was drawn from it."

Lowell was our representative man of letters. He was a great critic, an essayist, poet, diplomat and scholar. As a poet he had a

wider range than any other of our American poets. In his poetry he was an appreciative lover of Nature, a humorist, a patriot and a satirist, and he also wrote poems of sincere thought. His versatility is equaled by no other American man of letters.

Scott

Sir Walter Scott came of a well-known Scottish family. Scott himself said that his birth was "neither distinguished nor sordid;" in the common language of the country the Scotts were "gentlefolk." Pride of family Scott considered "natural to a man of imagination." This pride sometimes led him into courses to his disadvantage, but at the same time it constantly spurred him on to exertion and to a high conception of duty. On the ceilings of Abbotsford are displayed the arms of about a dozen Border families with whom Scott's family claimed relationship.

In his autobiography Scott gives many interesting details of his boyhood. For example, he was sometimes called a dunce and an idler. Very carefully he explains why some people who did not like him might misrepresent the facts. As an infant of two years he had suffered severely from a fever which left its influence on him for life, his right leg being a trifle shorter than his left. His health as a boy was uncertain and his attendance at school was consequently irregular. Thus his studies suffered from forced inattention. Even as a child he seems to have been a favorite with his elders, and he spent many happy hours listening to the stories they gladly told him. As he grew older he steadily pursued his favorite studies of history and romance. He acquired a reputation among his schoolfellows for queer bits of knowledge and for story-telling—a reputation he worked hard to sustain as compensation for his indifferent standing in the regular school work. He studied French and Italian in order that he might read more romances in the original. This willingness to study hard in the pursuit of his pleasure was characteristic of Scott. He ransacked libraries for new material and by the time he was twenty-one was known for his ability in deciphering old manuscripts.

It was as a poet that Scott first established a literary reputation. In 1796 he published a number of translations from the German, and six years later issued the first part of his collection of *The Minstrelsy of the Scottish*

Border; but it was not till 1805 that the *Lay of the Last Minstrel* placed him among the famous poets. This was followed by *Marmion* and the *Lady of the Lake*, both of which added greatly to Scott's popularity. Meanwhile he had been writing, though anonymously, the remarkable series of *Waverley Novels*. Not until five years before his death did he publicly acknowledge the authorship of these books, but the fact had been more or less of an open secret for a number of years.

The last years of his life were filled with trouble and sorrow. His business ventures turned out unfortunately and he was forced into bankruptcy. He labored in every way to pay off the enormous debt of his partners. In 1830 he suffered a stroke of paralysis from which he never fully recovered. The last months of his life were pathetic, as he died happy in the delusion that he had paid all his debts. No man ever showed a nobler sense of duty than Scott, when he literally wore himself out to pay obligations he could easily have avoided.

Louisa M. Alcott

Louisa M. Alcott, the best American writer of children's stories, was of English ancestry. Her ancestors on her father's side were connected with the founders and governors of the chief New England colonies, and her mother was descended from a distinguished New England family. Miss Alcott's father, the famous Amos Bronson Alcott, was an unpractical idealist, though a very scholarly man. Her mother was a woman of fine mind, broad sympathies and unselfish generosity. Their gifted daughter seems to have inherited striking traits of both parents.

When Louisa was two years old the family removed to Boston, where Mr. Alcott opened a school. During this period, Louisa began a journal at the age of seven, which she kept for many years. Her personal experiences and those of her family, as there recorded, furnish very interesting reading.

In 1840, when Louisa was eight years of age, the Alcotts removed to Concord, Massachusetts, where some of her happiest days were spent. Among her neighbors were the little Emersons, Channings and Hawthornes, a noteworthy group of playmates. Some of their childish plays she afterwards reproduced in "Little Men."

Amos Alcott was a man of scholarly attainments and lofty ideals, but he lacked the

ability to earn a comfortable living for his family. For many years his devoted wife and children suffered many privations, and the burden was not lifted until Louisa was old enough to shoulder some of the responsibility. The Alcott children were taught by their father, who had peculiar views on education and favored the Socratic method of questioning. Their minds were led to develop gradually and they were encouraged to express themselves freely and naturally.

In 1845 the family acquired a home in Concord, which is described in "Little Women," Miss Alcott's masterpiece. That story, best beloved of books by children of two generations, is based on the actual experiences of the Alcott family. The Meg of the book is the elder sister of Louisa. The wayward Jo is Louisa herself. Beth is a younger sister, Elizabeth, and Amy is the pretty and graceful May Alcott. Mrs. March is a reproduction of Mrs. Alcott, only, as Louisa says, "Not half good enough." The charming Laurie is a Polish lad whom the authoress met in Europe. The great charm of the book is its naturalness. It rings true. This can be easily understood when we consider that Miss Alcott was writing about her own life and that of her family. The book has been translated into French, German and Dutch.

Louisa wrote rhymes and plays when a girl, and had a story published which she wrote when she was but sixteen. Her real literary career began, however, when she was twenty-two, when she published a book of stories for which she received \$32. For several years she devoted herself to making the family more comfortable, and she taught, sewed and wrote. After buying bonnets for the sisters with money received from writing, she said, "The inside of my head can cover the outside."

During the Civil War she became a nurse in a hospital, and has reproduced some of her experiences in "Hospital Sketches." This book has deservedly become very popular. The nursing resulted in a severe illness, and her health was never so robust again. "Old Fashioned Girl" is a bright and cheerful story, but it was written under very depressing circumstances. In her best books, Miss Alcott seems to be all humor and good cheer, but her life was a hard one, full of work and responsibility and saddened by the death of her mother and two younger sisters.

Her influence has been of the best. Her books for children, by which she is best

known, are both wholesome and entertaining, and undoubtedly will be the delight of young readers for years to come.

Hawthorne

Hawthorne was a descendant of William Hawthorne, who came to Massachusetts from England in 1630. This ancestor was a stern Puritan and his son was one of the judges who condemned to death some of the victims of the Salem witchcraft. The Hawthornes became seamen; the grandfather of the novelist commanded a privateer in the Revolution and his father was a captain in the merchant marine.

Hawthorne's early days were spent in Salem, full of reminiscences of the stern old Puritan days. As a child, he read Shakespeare, Milton, Pope, Bunyan and Thomson, and with his own money bought a copy of Spenser's "Faery Queene." Among his teachers was Worcester, the famous dictionary-maker.

A part of his boyhood was spent in Maine on his uncle's estate. The wild scenery of the sparsely settled region and the primitive manners of the people greatly stimulated his imagination. He says of this period, "I lived like a bird of the air so perfect was the freedom I enjoyed." During the moonlight nights he would skate until midnight all alone upon Sebago Lake, "with the deep shadows of the icy hills on either side."

He entered Bowdoin College at the age of seventeen. Among his classmates were Longfellow and Franklin Pierce, the latter of whom became his lifelong and well-beloved friend. It is said that in college he ranked low in mathematics and metaphysics and that he found the required chapel declamations appalling. For twelve years after leaving college he lived in retirement in Salem, where, in an upper room of his mother's home, he wrote and dreamed. He speaks of this room as a place where he sat a long, long time, waiting for the world to know him. The result of these long years of effort was "Twice-Told Tales," his first important work.

Hawthorne was thoughtful, reserved and quiet, but at times he enjoyed fun and jokes. His friend and biographer, James T. Fields, tells us that while they were in England together, they attended a reception given by an intelligent English lady, who asked Hawthorne to write in her autograph album. Hawthorne implored Fields to tell him what

Outline on Reading

I. PURPOSES OF STUDY OF READING.

- (1) Thought getting and thought giving
- (2) Acquiring general knowledge
- (3) Development of taste for best literature
 - (a) Increasing general culture
 - (b) Promoting scholarly speech
- (4) Training the mental powers
 - (a) To strengthen memory
 - (b) To develop the will through increase of knowledge
 - (c) To render choice easier
 - (d) To strengthen imagination

II. READING IN PRIMARY GRADES

- (1) Purposes of primary reading
 - (a) Acquiring thought
 - (b) Adding to vocabulary
 - (c) Correct pronunciation
- (2) Material used
 - (a) Courses of study as provided
 - (b) Regularly adopted texts
 - (c) Supplementary readers and primers

III. READING IN INTERMEDIATE GRADES

- (1) Purposes of the reading class
 - (a) Mastery of thought
 - (b) Adding to vocabulary
 - (c) Inducing a desire for good literature
 - (d) Correct inflection and expression
- (2) Material used
(Same as II, (2) above)
- (3) Devices for increasing interest
 - (a) Discussions and explanations
 - (b) Geographical references studied
 - (c) Mythological references explained
 - (d) Historical setting made clear

IV. LASTING BENEFITS

(Name at least three, and assign reasons.)

to say, and the latter, in a spirit of fun, suggested the old doggerel:

"When this you see
Remember me."

The famous romancer immediately wrote the couplet and signed his name to it.

On the way home from Europe, Mr. Fields found the Atlantic too much for him and suffered greatly from seasickness. Hawthorne was a splendid sailor and used to console his friend by suggesting all sorts of fanciful dishes. "He would lie by my side," says Mr. Fields, "and tell me to try a few roe's eggs beaten up by mermaid on a dolphin's back, or gruel made from a sheaf of Robin Hood's arrows. He thought the proper clothing for a sea trip to be raven-down stockings, and sable clouds with a silver lining."

Hawthorne's last days were spent quietly in Concord. Emerson was one of his neighbors, and he speaks of his coming to call with a "sunbeam in his face." Just before he died he started a new romance, and the unfinished manuscript was laid upon his coffin. He was buried under a group of pines on a hillside overlooking the historic fields of Concord. Among the friends who saw him laid to rest were Emerson, Channing, Agassiz, Lowell, Alcott, Holmes and Franklin Pierce.

READING, METHODS OF TEACHING. Reading is a thought-getting and thought-giving process. The first is silent reading; the second, oral reading. The purpose of teaching a child to read is to enable him, first, to get the thought from the printed page, and second, to give that thought to others. Thought-getting, or learning to read, characterizes the greater part of the instruction in reading during the first three years the child is in school. The process includes the following steps, each of which should receive careful attention: (1) Learning the meaning of words; (2) learning the forms of words; (3) learning the sound of words, or their pronunciation; (4) understanding the thought in the sentence; (5) understanding the selection read.

Primary Grades. The reading in the primary grades includes that of the first three years in the well-graded school. During this time the child should not only learn to recognize words and sentences, but he should become reasonably proficient in reading from books within his capacity. In order that this end may be reached the teacher should

give careful attention to two phases of the work:

Methods. There are three methods of teaching primary reading in general use. They are known as the sentence method, the word method and the phonic method. The sentence method begins with the sentence, which the pupils are taught to read at sight, then proceeds to the study of the separate words in the sentence, so that they may be recognized alone. Since the sentence is the unit of thought and of expression, and since the child grasps things as wholes, this is by far the most desirable method to use at the beginning. It is much easier to teach a child to read a sentence, as, "I have a cat; John has a book," than it is to teach him to recognize the same number of words when they have no relation to each other. Hence the skilful teacher in reading selects, for her first lessons, certain objects in which the children will take a lively interest, and after obtaining from them, through questioning, desired sentences, she writes these upon the board in a plain hand, then has the pupils read them.

The next step is to lead the pupils to recognize the different words and phrases as they occur, by asking different questions and leading the pupils to make other statements about the object. This is usually accomplished by having the pupils read sentences containing the same words in different order. After drills of this sort the pupils quite readily recognize the different words in the sentence when written upon the board. From this it will be seen that the sentence method and the word method are inseparable. In fact, the so-called word method is only a phase of teaching reading by the sentence method.

The phonic method consists in the analysis of words, for the purpose of discovering the sounds of the letters which the words contain. It should not be introduced until the pupils have been reading for some months. In the second reader grade, it can be applied successfully if too much is not attempted, and in the third reader grade a good deal of attention should be given it, because when once learned, this method places the pupil in possession of the ability to discover and pronounce a great many new words for himself. From this it will be seen that the successful method in reading consists in the blending of the three methods here described,

and no teacher can obtain the best results without using them all, and substantially in the order named.

The Recitation. The teacher should make careful preparation for each recitation. In doing this, she should observe the following points:

(1) Plan to present the lesson in an interesting manner; (2) plan to have the class learn one or more new words; (3) review the words previously learned, by combining them in new sentences; (4) select for the lessons such sentences as will prepare the pupils for the reader. Before the book is placed in their hands, they should learn all of the words and many of the sentences found on the first eight or ten pages. In rural schools it is necessary that the books be placed in the hands of the pupils at the earliest possible date; hence, the teacher should give the first reader careful study, before beginning the work in reading with her entering class.

In the recitation, the reading and the word study must be carried along together, but if much time is needed for word study, greater progress is made by devoting one period to reading and another to drill on words. The teacher should lead her pupils to read in natural tones and with correct expression. In case they have difficulty with pronunciation, drill exercises on the difficult words should be given.

Intermediate and Grammar Grades. The work in reading in these grades is for the purpose of leading the child to love good literature, to acquire ability in silent reading and fluency in oral expression. In order that these ends may be secured, the intellectual element in reading should receive careful attention in these grades. Children cannot take interest in what they do not understand; hence, when a difficult selection is presented, it is wise for the teacher to discuss the selection with the class before the lesson is studied. In doing this, she should explain all the difficult passages. At the time of the recitation the pupil's understanding of these passages should be tested before the lesson is read; otherwise, he will stumble in the reading.

At this period the pupils should be introduced to the use of reference works, if such works are at their disposal. In case they are not, the teacher should give the information which the pupils cannot obtain for

themselves. It is all-important that the class get the proper setting for the lesson. This setting should include the imaging of the scene and an understanding of the most important mythological, historical, geographical and other allusions which the selection may contain. The emotion necessary to proper expression will naturally follow the comprehension of the subject matter.

In order that the teacher may successfully conduct exercises in reading in these grades, it is often necessary that she study broadly, as the selections frequently contain allusions to the various branches of natural science, mythology, history, art and the greater works of literature.

Much valuable assistance in teaching reading may be obtained from the prefaces found in all of the better series of readers. These should be carefully studied by every teacher. The teacher of primary reading should also make a thorough study of the readers which the pupils are to use. This study should be from the teacher's point of view and should enable her to obtain a thorough understanding of the plan of each book, of its gradation and of the steps necessary to lead the pupils from the first to the second reader, and from the second to the third reader. Many series of readers are defective in this respect and need more or less supplemental work.

READING, *red'ing*, FIRST MARQUESS OF, RUFUS DANIEL ISAACS (1860-1935), an English nobleman of Jewish faith. He was born in London, attended the University College School there, and later pursued his studies in Belgium and Germany. A successful barrister in London, he became Solicitor General in 1910, Attorney General, 1910-1913, and was member of parliament from 1904 to 1913. From 1913 to 1921 he was Lord Chief Justice of England. In 1915 he headed an Anglo-French Commission to the United States to negotiate a \$500,000,000 loan for the allies. As Viceroy of India, 1921 to 1926, he was remarkably successful. A Liberal in politics, he entered the National Cabinet of 1931 as Foreign Minister.

He was distinguished as a jurist for his humanity in conducting criminal cases. As an administrator he showed critical insight and a rare diplomacy tempered with sternness at times of crisis.

He was created baron in 1914, viscount in 1916, earl in 1917 and marquess in 1926 on his return from India.

READING, *red' ing*, PA., fifth city in size in the state and the county seat of Berks County, 58 miles northwest of Philadelphia, on the Schuylkill River, on the Pennsylvania and the Reading Company railroads. There are inter-city bus lines and an airport.

Higher education is provided at Albright College and in the extensions of the University of Pennsylvania and of Pennsylvania State College. The coeducational high school cost \$1,500,000. There are also excellent private schools and business colleges. Other prominent institutions are the four public hospitals, the city hall, the courthouse, the Federal building, a Masonic Temple, the museum and art gallery and more than 100 churches. The fair grounds cover 60 acres.

The city is near the anthracite coal fields, in a region of large mineral wealth; the soil is very fertile. The factories number 700 and produce a great variety of goods; about one-fourth are iron and steel products. Here are the shops of the Reading railroad.

The place was first settled by German colonists, but many English came later. The city was founded by Thomas and Richard Penn, sons of William Penn, in 1748. It became a military base in the French and Indian wars. During the Revolution it was a patriotic center and a prisoners' camp for the captured Hessians. Reading was an early pioneer in the manufacture of iron products including stoves, castings and military ordnance. It was chartered as a city in 1847. Population, 1930, 111,171.

REALISM, in scholastic philosophy, declares that universal ideas have an existence which in a genuine sense is independent of concrete objects. This doctrine is based on Plato's teachings inspired by Socrates who taught that actual knowledge is gained only from the concept or general idea. In modern philosophy realism means a total rejection of the doctrine "ideas" by affirming that each object perceived does exist as an independent thing without essential dependence on mind. The "new realism" of England and America believes that knowledge consists of identity of structure and possibly of content in the relation between a knowing state and a known object.

In literature and the fine arts realism excludes imagination as far as possible; it is a frank literalism applied to artistic imitation. In poetry classic formulas are avoided. The reader must be privileged to experience

in the poet's reproduction as nearly as possible the sounds as heard, the throbbings of heart and the unstudied responses of living creatures. The novelist in his unpolished phrases deals out the jargon and the secret thoughts of his characters, set off by the odors and clatter of attending circumstances. The painter discards most of the "rules of drawing" and flings splotches of color on the canvas, so representing the human form in convulsions. The sculptor reflects the breaking of hearts and the cracking of bones in human conflict. Thus the refined and elegant features of life and civilization tend to fade from art.

Related Articles. Consult the following titles for additional information.
 Concept Naturalism Transcendentalism
 Idealism Philosophy
 Metaphysics Scholasticism

REAL PROPERTY, or REAL ESTATE, includes land, the houses and trees upon it and the minerals beneath the surface. In law, the term includes land and all property that cannot be removed without being destroyed. At the death of the owner, real property descends to his legal heirs. In case the personal property fails to pay the indebtedness, the administrator is required to sell enough real estate to make up the deficiency. Real estate cannot be sold except on a written contract. See **DEED**.

REAPING MACHINE, a machine used in the harvesting of wheat, oats, and other small grains. Pliny, Roman historian, described a crude device in use in Gaul. There were over a dozen types of cutting machines invented in Germany, Holland, Scotland, England, and the United States during the seventeenth and eighteenth centuries.

Modern Harvester. The first modern-type machine with a reciprocating knife and stationary fingers was invented by an Englishman, Henry Ogle, in 1822. Modern agriculture, however, was born in 1831, when Cyrus Hall McCormick pushed his first reaper out of the blacksmith's shop on his father's farm in Virginia. This was the world's first practical reaper. The following year Obed Hussey, of Cincinnati, O., invented a reaper essentially the same in principle with a different cutting apparatus.

The improved McCormick self-rake reaper, patented in 1858, was the first practical power harvester. That year the Marsh Brothers, of DeKalb, Ill., obtained their first patent on a hand-binding harvester, which

was destined to revolutionize the harvesting machine industry. With this harvester as a basis, S. D. Locke, of Janesville, Wis., developed, and in 1871 patented, a self-binding machine using wire to tie the bundles of grain. The Gordon Brothers, in connection with William Deering, also developed a wire-binding type.

In 1875 John F. Appleby, of DePere, Wis., invented a twine knotter, which became the foundation for the binding apparatus of almost every twine binder. Since 1882 all successful grain binders are practically the same machine, differing only in improvements in detail. Steel construction, anti-friction bearings, tractor-power drive, etc., are contributions of modern engineering and manufacturing methods. The harvester-thresher, the tractor, plow, cultivator, and other machines of the modern farmer are the outgrowth of McCormick's first crude but practical attempt to bring machinery to the aid of the farmer. The reaper was gradually but consistently improved until it developed into the modern harvester or self-binder of today. The newest harvesting machine is the "combine," which not only cuts the grain but threshes it also in one continuous operation.

Without the modern harvester the great crops of wheat, oats, barley and other grains could not be so effectively raised. Whereas by the primitive sickle and scythe methods of 1830 it required 64 hours to harvest an acre of wheat, a century later it took less than two hours and a half.

The development of the reaper and other harvesting machinery has enabled man to raise more abundant crops, thus increasing the world's food supply, and removing much of the drudgery from the farm. See MCCORMICK, CYRUS HALL; WHEAT, OATS

REASON, or REASONING. Reasoning is the third or final stage in thinking. In reasoning we compare two judgments, and conclude that they agree or disagree. One of the judgments is a general or class idea, the other is a particular, or a more restricted, idea. To illustrate, we have a piece of oak and ask the question, "Will this oak burn?" In answering the question we pursue the following trend of thought:

All wood burns
This oak is wood.
Therefore this oak will burn

In formal reasoning, the general proposition is called the *major premise*, and the

particular proposition the *minor premise*. These premises and the conclusion constitute a *syllogism* (which see).

The ability to reason depends upon two factors: (a) the intelligence of the person, (b) the extent and accuracy of his knowledge. It might almost be said that the latter depends upon his powers of observation and ability to remember and relate the different things he observes. A good reasoner is able to classify his ideas and select the ones bearing on the problem in hand, rejecting those which do not apply.

A boy has caught a bat and wants to decide whether it is a bird or whether it really is a bat. He remembers his previous observations of birds, the structure and form of their bodies, wings, eyes, skin, and so on.

He must also remember what he knows about bats, which he may never have really seen, but only has been told about. He finds that the creature in his hands has a kind of fur all over it, and that its wings stretch out over frames that are more like long, joined-up fingers. He says, "All birds have feathers. This creature has no feathers, therefore it cannot be a bird." That is reasoning. He then thinks, "Bats are something like birds, but do not have real wings, but ones which are like fingers joined together. This creature is like that, therefore it is probably a bat." Then he goes on with further reasoning to check his conclusion.

Note that the boy must have accurate knowledge, must be able to remember this knowledge, and must have the intelligence to pick out the right things to base his judgments on. An unintelligent boy might concentrate his attention on the eyes of the creature in his hands, and so fail to properly name it.

Training the Reason. Much reasoning is not about objects observed, but consists of the relating of ideas. If the ideas are not correctly formed in the first place, then no matter how good the reasoning is, the resulting conclusion must be wrong. Reasoning, however, may help to correct false ideas. It can be developed by training in (a) observation of forms and details, and in accuracy of observation, (b) making of comparisons between one thing and another, (c) proper classification of objects and ideas, (d) memory. Children develop reasoning powers as their intelligence and their knowledge develops—no faster and no slower.

Related Articles. Consult the following titles for additional information

Attention	Judgment
Concept	Memory
Deductive Method	Perception
Imagination	Syllogism
Inductive Method	Will

REBELLION, *re bel'yum*, OF 1837, a simultaneous uprising in the two provinces of Eastern Canada, made by the radical political element in an effort to secure a more representative government. By the Constitutional Act of 1791 Canada had been divided into Upper Canada (later Ontario) and Lower Canada (later Quebec). For fifty years these two provinces maintained separate governments; each was ruled by a governor, an executive council corresponding to a cabinet, a legislative council and an assembly elected by the people. As the governor and the legislative and executive councils were appointed by the king, there was great discontent over the operation of the law. In Lower Canada, occupied largely by French, discontent arose almost immediately, and there continued to be friction between the assembly, made up almost entirely of French, on the one hand, and the legislative council and the governor, all English, on the other. The troubles came to a focus in 1837. The assembly wanted full control of the provincial treasury, an elective legislative council and the right to fix the status of the French language and the Roman Catholic religion in the province. The British government sent over a commission to examine the situation. Its recommendations precipitated an armed revolt led by Louis Joseph Papineau (which see). There were several small engagements between the rebels and the British forces, but the trouble was quickly put down.

Parallel with this movement for political reform in the lower province, a similar one had been taking place in Upper Canada. There, even greater emphasis was placed upon responsible government, and the more radical element dreamed of complete independence and a republic. Emboldened by the revolt in the lower province, William L. Mackenzie broke with Baldwin and the more moderate reformers and organized a rebellion, renouncing all allegiance to England. This was soon quelled.

Thus the rebellion in each quarter ended in a fiasco. It had one important result,

however. Lord Durham was sent over from England as Governor-General and High Commissioner; and although he failed to cope with the situation successfully as an administrator, a famous report prepared by him in 1839, suggesting the causes of the trouble and remedies for it, led to the Act of Union of 1840. See CANADA, subhead *History*.

RECALL, *The*, a provision in government which enables the people to remove officials from office before the end of their term. Originally the law applied only to officials who were elected, but its application has been extended to appointive offices and, in some states, to judges. Proceedings under the recall act are begun by filing, with a designated official, a petition which has the required number of signatures (twenty to thirty per cent of the voters at the last election), and sets forth charges against the official whose removal is sought. Thereupon a recall election is ordered. The name of the official accused is placed on the ballot, and other candidates are placed in nomination by the usual method. The special election thus ordered is conducted like any other. If the accused official receives a majority vote, he is vindicated and remains in office. If another candidate receives a majority, the accused is retired. The recall was first adopted in America in Los Angeles, Calif., in 1903, and has since been adopted for state-wide purposes in more than twenty states and in many cities. See INITIATIVE; REFERENDUM.

RECEIPT, *re seet'*, a written acknowledgment or account of something received, as money or goods. A receipt for money may be in part or in full payment of a debt, and if true, not fraudulently secured and uncontradicted by other evidence, it operates as an acquittance or discharge of the debt or part of the debt which it includes. A receipt should specify for what it is given—for payment in full, for payment on account, or for payment of some special account. A bill marked *paid* is a receipt.

RECEIVER, *re seev'er*, a person appointed by a court to take charge of a bankrupt business and conduct it as the court may order; or to take charge of property involved in litigation between interested parties. He is an officer of the court and is empowered to collect rents, issues and profits thereof pending the final settlement. Property which is subject to judicial con-

trovery is always in danger of being lost, and therefore the appointment of a receiver is an important step towards its preservation.

The receiver is expected to exercise his judgment in the management of such property, and negligence exposes him to the charge of misconduct. When in doubt as to the best course to pursue he may apply to the court for authorization. In general, a receiver has no authority to sue unless directed by the court to do so. Among the typical cases requiring a receiver are the following:

1 If a person dies without making a will a receiver or an administrator is needed to manage his property until the rightful heirs come into possession of it

2 If a property owner is an infant or a lunatic without guardian

3 When two persons lay claim to a property, neither can have anything to do with it until the court has rendered its decision, and in such case a receiver is necessary

4 When a relative accredited with the guardianship of property is guilty of neglect or mismanagement, a receiver may be appointed

5 When partners cannot agree upon the conduct of their business, the case requires a receiver

6 In the case of insolvency a receiver is appointed to satisfy as far as possible the claims of creditors

RECIPROCITY, a tariff arrangement between two nations in which each agrees to import goods from the other free of duty or

at a rate of tariff lower than that fixed by law. Reciprocity affords nations which hold to a strict protective tariff policy opportunity to make tariff agreements with other nations which may be advantageous to both parties

The United States has agreed to a few reciprocity treaties. The McKinley tariff law of 1890 provided for the admission of sugar and certain other articles free from those countries which gave reciprocal trade favors to the United States. The Dingley Act of 1897 greatly limited the government's power in respect to framing reciprocity treaties, making them dependent upon the Senate's sanction. Under this law treaties were negotiated with France, Portugal and Italy. The tariff act of 1909 was against reciprocity. It withdrew from the President the limited power he had to make reciprocity agreements, and cancelled reciprocity agreements with nine countries, including England and Germany. In 1911, Canada rejected by popular vote a plan of reciprocity proposed by the United States. In 1934 the Congress gave President Roosevelt wide authority to negotiate "trade agreements." See TARIFF

RECLAMATION, BUREAU OF, a bureau in the United States Department of the Interior which supervises the reclamation of arid and semi-arid lands in the western part of the country, by means of irrigation. The bureau was organized by an act of Congress

Principal Irrigation Projects of the United States:

Project	Irrigable Area, Acres	Estimated Cost
Ariz. Coolidge	100,000	\$5,500,000
Ariz. Salt River, or Roosevelt	250,000	12,744,000
Ariz.-Calif. Yuma	112,000	9,374,000
Ariz.-Calif.-Nev. Boulder	2,000,000	165,000,000
Calif. Orland	20,000	2,400,000
Colo. Grand Valley	50,000	4,860,000
Colo. Uncompahgre	75,000	6,423,000
Idaho. Boise, or Arrowrock	345,000	16,000,000
Idaho. Minnidoka	813,000	15,000,000
Mont. Huntley	32,000	1,562,000
Mont. Milk River	144,000	6,828,000
Mont. Sun River	107,000	7,344,000
Mont.-So. Dak. Lower Yellowstone	57,000	3,682,000
Neb.-Wyo. North Platte, or Pathfinder	235,000	19,208,000
Nev. Newlands	90,000	7,957,000
N. Mex.-Tex. Rio Grande, or Elephant Butte	155,000	15,000,000
Oreg. Umatilla	17,000	5,138,000
Oreg. Vale	30,000	3,408,000
Oreg.-Calif. Klamath	174,000	6,137,000
Oreg.-Ida. Owyhee	123,000	10,000,000
S. Dak. Belle Fourche	80,000	4,600,000
Utah. Salt Lake Basin	77,000	2,850,000
Utah. Strawberry Valley	7,000	3,500,000
Wash. Okanagon	54,000	1,452,000
Wash. Yakima	7,000	16,000,000
Wyo. Riverton	340,000	8,900,000
Wyo.: Shoshone	100,000	208,000
	208,000	10,000,000

approved June 17, 1902, and a fund was created from moneys received from the sale of public lands. As lands placed under irrigation are sold, the sums received therefor are added to the fund, which is thus constantly being renewed. The fund is also augmented by royalties from oil, gas, mineral and Federal power leases. The table on page 3033 shows the cost and irrigable area of some of the largest projects.

How the Land is Obtained. Reclaimed lands are open to settlers in tracts of 20 to 160 acres, depending upon the area, which, in the opinion of the Secretary of the Interior, is sufficient to support a family. Under the present law payment of the cost of constructing the irrigation works is made by the settlers in graduated payments over a period of 20 years.

Owners of private lands are allowed to take water from the government ditches on the same terms as settlers on the government lands; this privilege is restricted to service for 160 acres, to prevent monopoly.

Water Power. Water from the reservoirs may be used for power as well as for irrigation. The gross revenue of the Government from users of water for irrigation and power is over \$5,000,000 a year. Since its organization, the Bureau has thus collected nearly \$175,000,000 for such uses.

Extent of the Bureau. The Bureau of Reclamation maintains a force of about 4,000 persons, and its annual expenditures approximate \$9,000,000. One division of the bureau, under the Director of Farm Economics, has charge of crop production, handling and marketing, improvement of farm conditions, industrial betterment, and settlement of lands. See IRRIGATION; CONSERVATION.

RECONSTRUCTION, *re kon struk'shun*, the process by which the states that seceded from the American Union in 1860-1861 were restored to their natural relation with the other states. President Lincoln held the theory that the act of rebellion in each state was not the act of the state, but of disloyal conspirators within the state. The states therefore were still members of the Union, and could be restored to normal relations with it by the creation of loyal state governments. He also considered this restoration of loyal state governments to be an executive rather than a legislative act, because the power of pardon rested with the President only. The theory held by the leading party in Congress

was, that by the act of secession these states were deprived of all civil government, and that they existed as disorganized districts subject to the authority of the United States, to be expressed by Congress. A bill embodying this theory was passed in July, 1864. It was vetoed by the President and was not repassed.

Lincoln appointed military governors for Louisiana, Arkansas and Tennessee, and they proceeded to establish loyal governments in their respective states, but their representatives were denied admission to Congress. He proclaimed pardon to all who would take an oath to support the Constitution of the United States, with the exclusion of certain persons who had held office under the Confederacy.

Just at this critical time Lincoln was assassinated. His successor, Andrew Johnson, was capable, but was without tact. He continued Lincoln's policy, issued a proclamation of amnesty and pardon, and established loyal governments in North Carolina, Mississippi, Georgia, Alabama, South Carolina and Florida. Johnson's tactless disregard of Congress brought about a strife between him and that body which reached its climax in his impeachment. He was, however, acquitted.

Meantime Congress enacted drastic laws for the reconstruction of the Southern states. These laws extended the right of suffrage to the negroes, divided the South into five military districts and placed each under the command of a major-general of the United States army. The negroes proceeded to legislate for their states, a task for which they were in no wise prepared. Unscrupulous politicians from the North, called *carpetbaggers* because it was alleged that they could carry all their personal effects in the carpetbag valises they carried, organized the negroes in their own interests. These measures resulted in a period of waste, extravagance and misrule far worse than was predicted by the most strenuous opponents of this plan of reconstruction. Gradually public sentiment in the North changed and saner views prevailed.

During Grant's administration conditions became much better, and all the states were restored in 1870. In 1872 Congress passed an amnesty act removing all disqualifications from ex-Confederates. Early in his administration President Hayes ordered the Federal troops removed from the Southern states, and the period of reconstruction was brought to an end.

RECONSTRUCTION FINANCE CORPORATION. As an emergency measure for financial and economic relief to the country, the Congress of the United States in 1932 established the Reconstruction Finance Corporation. With an original capital of \$500,000,000 supplied by the Government, and credit of \$2,000,000,000 more, endorsed by the Government, the corporation is empowered to make loans on proper security to banks, savings banks, trust companies, building and loan associations, insurance companies and railroads. The corporation is administered by a board consisting of the Secretary of the Treasury, the chairman of the Federal Farm Loan Board and four members appointed by the President.

RED, one of the primary colors, the color of that part of the spectrum which is farthest from the violet. The red rays are the least refrangible of all the rays of light (see **LIGHT**, subhead *Spectrum*). Red pigments or coloring matters include vermilion, realgar, cochineal, lakes and madders, coal-tar colors and other substances. By varying the intensity of the color, numerous shades of red can be produced. Because it is the color of blood, red is associated with anger and other violent passions. It forms one of the national colors of England and of the United States. The red flag has been universally adopted as the emblem of the world's radical societies, which aim at the destruction of existing order. In the United States this flag is used by the anarchists. Red is one of the colors used in three-color and four-color printing. See **PRINTING**, subhead *Color Printing*.

RED BIRD, the popular name of several birds in the United States. See **CARDINAL BIRD**; **BALTIMORE ORIOLE**.

RED CEDAR, a species of juniper which grows in North America and the West Indies. See **JUNIPER**; **CEDAR**.

RED CLOUD (about 1825-1909), a famous Sioux Indian chief who was associated with Sitting Bull in Black Hills warfare between 1863 and 1868. He was also active with the Crow and Blackfoot tribes against the whites, and his enmity was particularly emphasized when the Sioux surrendered large areas to the government. He boasted of over eighty separate deeds of valor in fighting the white men. After making peace Red Cloud represented his people on numerous occasions in Washington. He was succeeded in his tribal post by his son, Jack Red Cloud.



RED CROSS SOCIETIES, a name applied generally to those societies maintained in various parts of the world for the purpose of relieving distress in time of war, flood, earthquake and similar disasters. The first Red Cross organizations were formed immediately after the Geneva Convention of 1863, and their original object was to assist the wounded in time of war.

Later their activities expanded until they covered the present wide field of humanitarian work. Each national society bears its special name, as American Red Cross, French Red Cross, etc., but all national organizations have a bond of union in the International Committee for the Relief of the Wounded in War. This committee has its headquarters at Geneva, Switzerland. More than fifty nations now have agreed to the principles of the Red Cross movement.

The distinctive badge of the societies is a red Greek Cross, on a white ground. In whatever form this badge is seen, as an emblem on the uniform of the Red Cross nurse, a design on an ambulance or a flag floating above a hospital, it is a symbol of neutrality and mercy, and commands the respect of all belligerents.

The American Red Cross. The existing society maintained by the United States was incorporated by act of Congress in 1905, but an organization had been perfected by Clara Barton in 1881 (see **BARTON, CLARA**). By the law of 1905 the original society was dissolved. The President of the United States is president of the American Red Cross, but the actual administration of affairs is under the control of a committee, the chairman of which is appointed by the President. The organization is supported entirely by voluntary contributions from millions of people.

During the World War the activities of the society were vastly multiplied, especially after America became a belligerent. During the conflict, two great war funds were over-subscribed, amounting to \$115,000,000 and \$176,000,000, respectively, and over \$24,000,000 was collected from membership dues. The local chapters, through their work-rooms, produced garments for refugees,

hospital supplies and garments, knitted articles and surgical dressings having a total value of about \$44,000,000. When the armistice was signed in November, 1918, the society had an enrollment of over 20,648,000, besides 8,000,000 members of the Junior Red Cross.

The peace-time service of the Red Cross Society is a vital contribution to world welfare. Everywhere it assumes a burden of relief almost at the moment disaster is reported.

In the year 1935 it extended its aid to 611,000 sufferers in the greatest number of disasters in any year in the history of the organization; in 128 localities in thirty-eight states, in thirty areas in American insular possessions, and in two foreign catastrophes, as well as in war service in Ethiopia, its flag of mercy was flown. That year is cited as evidence of its preparedness and of the extent and universality of its ministrations. It is always ready for any emergency.

The Junior Red Cross was organized during the World War to permit children to participate in phases of war service; it has been continued as a department of the main organization. It enlists children in the service of suffering childhood, and secures to them "those rich attitudes and habits of mind which can grow only out of unselfish service."

RED JACKET (1751-1830), a Seneca Indian chief, whose real name was Sagoyewatha. His English name was given him because of his great pride in a jacket given him by an English officer. During the Revolution he was a friend of the British, and later opposed every treaty for the cession of Indian lands to the United States government. During the War of 1812, however, he assisted the United States troops.

RED MEN, IMPROVED ORDER OF, a secret benevolent fraternity whose history may be traced to a secret revolutionary society organized in Maryland ten years before the outbreak of the Revolutionary War. This society was called the Sons of Liberty. In 1813 the existing organization took the name Society of Red Men, but it became extinct in 1830. In 1833-1834 the present Improved Order of Red Men was organized at Baltimore, Md. Its motto is "Freedom, Friendship and Charity." Local lodges, or tribes, are found in every state in the Union, in the Canal Zone, Hawaii and the Philippines, and the total member-

ship is nearly 500,000. Women relatives of members are eligible to membership in a branch known as the Degree of Pocahontas, to which men also may belong. The order makes use of legends, expressions and customs of the North American Indians, and meetings are held in "wigwams." The lighting of a council fire calls a meeting to order, and quenching the fire signifies adjournment.

REDMOND, JOHN EDWARD (1851-1918), an Irish parliamentary leader, born at Waterford. He was educated at the Jesuit College of Clongowes and at Trinity College, Dublin. Subsequently he studied law and was called to the bar. In the House of Commons he represented New Ross from 1881 to 1885; North Wexford from the latter date until 1891, and subsequently sat for Waterford; meantime, he became prominent in Home Rule propaganda. When the Irish Nationalists split at the time of the Parnell scandal, Redmond took the side of Parnell, and on the death of the latter he became the leader of the Parnellites; but in 1900 when the two opposing sides joined to form a new Nationalist party, he succeeded Dillon as leader of the Irish contingent, and he labored unremittingly for Home Rule until the passage of the Home Rule Bill in 1914. In 1915 Redmond was offered a place in Asquith's coalition Cabinet, formed for the more vigorous prosecution of the war, but he declined. Until his death, however, he placed the weight of his influence on the allied side.

RED RIVER, the southernmost of the great tributaries of the Mississippi. It rises in Northern Texas and has several tributaries, the chief, besides the main stream, being the North and South forks, which unite with it on the boundary of Texas. The stream then flows east-southeast, forming the boundary between Texas and Oklahoma, cuts off a corner of Arkansas, flows through Louisiana and falls into the Mississippi. Its other tributaries are the Wichita and the False Wichita. Its middle course is through a dense forest and the remainder is through fertile prairies. The Red River is about 1,200 miles long. During high water it is navigable to the Texas boundary, and boats of light draught ascend the stream as far as Shreveport, 360 miles, throughout the year. A portion of its waters reach the Gulf of Mexico through Atchafalaya Bayou.

RED RIVER OF THE NORTH, an important river of the Saskatchewan-Nelson sys-

tem. It rises in the west-central part of Minnesota, not far from the source of the Mississippi, flows southwesterly, then northerly, into Manitoba, where it empties into Lake Winnipeg. At Wahpeton, N. D., it is joined by the Bois de Sioux, which rises in Lake Traverse, and the two streams form the boundary between Minnesota and North Dakota. Its important tributaries are the Sheyenne and the Pembina in North Dakota, and the Assiniboine, which joins it at Winnipeg. Its length is about 700 miles, and it is navigable as far as Grand Forks, but it is now but little used for transportation purposes.

The basin of the Red River of the North has an area of 63,400 square miles, a large part of which is the bed of the ancient Lake Agassiz (which see), and constitutes one of the most important wheat-growing regions in the world. See WHEAT; also the articles MINNESOTA; MANITOBA.

RED RIVER REBELLION, *re bel'yun*, an uprising in 1870 against the Canadian Government by Indians and half-breeds, or métis, living in the Red River Valley in Manitoba. Previous to 1870 the métis had been under the government of the Hudson's Bay Company, who allowed them to live as they pleased, without securing titles to their land. In 1869 the Hudson's Bay Company transferred to the British government its claim to the vast territory extending inland from Hudson Bay. The following year the British government transferred the title to the Dominion of Canada, and a government survey was ordered. The métis naturally feared that they would lose their land; moreover, the excitement caused by the survey was increased by news that Hon. William McDougall had been appointed governor of the territory.

Under the leadership of Louis Riel a provisional government was organized. Riel took possession of Fort Garry, now Winnipeg, and ordered McDougall not to enter the territory. McDougall, seeing that the half-breeds had just cause for complaint, heeded Riel's order, and affairs would have been easily adjusted had not Riel ordered the execution of a young man, Thomas Scott. This act aroused such indignation throughout Canada that Colonel Garnet Wolseley with a force of 700 men was sent to put down the rebellion. Riel fled to the United States. The half-breeds were pacified when given 240 acres of land each, and the rebellion came to an end. See RIEL, LOUIS.

RED SEA, an arm of the Indian Ocean and an important waterway between Europe and Asia, lying between the Arabian Peninsula and Northeastern Africa. Its length is 1,200 miles and its greatest breadth is 200 miles. It is connected with the Indian Ocean by the Strait of Bab-el-Mandeb and the Gulf of Aden, and with the Mediterranean Sea by the Suez Canal. At the northern end it divides into two branches, the Gulf of Akabah extending into Arabia, and the Gulf of Suez, between Arabia and Egypt. The Sinai Peninsula, famous as the land where the Israelites wandered for forty years, lies between these gulfs.

The Red Sea fills an opening in the rocks into which the water flowed from the Indian Ocean. The mean temperature of the water is 77° in the north, 80° in the middle and 84° in the south. Coral reefs extend along the shores, rendering the sea dangerous to navigators, except in the middle channel, which has a depth of 2,000 to 3,000 feet. The shores are barren, and the heat is intense. On the east are mountains and tablelands varying in altitude from 3,000 to 6,000 feet, but the western shore is low.

Since the construction of the Suez Canal the importance of the Red Sea as a water highway is almost beyond estimate. Before the opening of this canal, traffic between Europe and the Orient was over long caravan routes, or around the Cape of Good Hope. The Phoenicians and Jews carried on an extensive commerce on this sea at the time of their greatest prosperity. The origin of the name is unknown. Edom, a country to the northeast, may have suggested the name, as *Edom* is the Hebrew word for red. See SUEZ CANAL.

REDSTART, one of the most charming of the American warblers. The prevailing color is black, but the wings, sides and tail at the base are a bright orange-red, and the lower parts are mainly white. Its beautiful color, sprightly habits and sweet song make the redstart a general favorite throughout the United States and Canada, where it spends the summer. It hops about from limb to limb in search of insects, and, in its flight darts upward, downward and sidewise, frequently rolling over and over like a leaf blown by the wind; yet these seemingly careless movements are for a purpose, for the bird is in pursuit of insects which it catches with great skill. The nest is built in a bush

or shrub from ten to fifteen feet from the ground, and contains four or five bluish-white eggs spotted with lilac and dark brown.

REDWOOD, a large tree of the cypress family, found on the western slope of the Coast ranges in Northern California and in Oregon. The redwoods are a species of sequoia, and are described under that heading.

REED, MYRTLE (1874-1911), an American author, born in Chicago, where she graduated from the West Division High School. In 1906 she was married to James Sydney McCullough. Her principal books, some of which were very popular, are: *Love Letters to a Musician* (1899); *Lavender and Old Lace* (1902); *Pickaback Songs* (1903); *The Master's Violin* (1904); *A Spinner in the Sun* (1906); *Old Rose and Silver* (1909); *Master of the Vineyard* (1910); and, published after her death, *Threads of Grey and Gold* (1918).

REED, THOMAS BRACKETT (1839-1902), an American statesman, born at Portland, Maine, and educated at Bowdoin College. He studied law and practiced for a time in Portland, served a year in the navy during the Civil War. He began twenty-two years of continuous service in Congress in 1877 and was chosen speaker three times. In the fifty-first Congress (1890), Mr. Reed practically destroyed filibustering by ruling that those members who were actually present but refused to vote, in order to prevent a quorum, should be counted. This precipitated a fierce parliamentary battle in the House and earned him the title of "Czar" Reed, but the Supreme Court sustained his decision. In 1896 Reed was an unsuccessful candidate for the Republican nomination for President.



THOMAS B. REED

REED, WALTER (1851-1902), a distinguished army surgeon who contributed an important chapter to the history of sanitary science. With associates he disproved that yellow fever is communicated by contact of man to man, but found that it is spread by the mosquito. This discovery made it possible very soon thereafter for Major General

Gorgas to free Havana from the disease during American occupation of Cuba, and to make life secure for white men in Panama during the construction of the canal.

REFERENDUM, the practice of referring proposed laws to the voters for approval or rejection. The referendum may be obligatory or optional. It is obligatory when the constitution requires the legislature of a state to submit all laws passed by that body to the voters for approval. It is optional when its application is left to the legislature or when a petition signed by a given percentage of voters is necessary to secure the submission of any measure to a vote of the people.

The referendum policy is fully developed in Switzerland, where all the cantons use it in some form. In the United States, the principle has always been in force in regard to the adoption or amendment of the state or Federal constitutions, but it is only since 1902 that it has been applied to other laws. In that year Oregon adopted the initiative and the referendum for all laws. The constitution of South Dakota had been amended in 1897 to permit use of the initiative and referendum, but no referendum took place for many years. Since then many other states and hundreds of municipalities have made the referendum a part of their law-making processes. See **INITIATIVE**.

REFLECTION. See **LIGHT**, subhead *Reflection of Light*.

REFLEX ACTION, an involuntary or unconscious movement caused by the communication of a sensory with a motor nerve through a nerve center. When the outer extremity of the sensory nerve is stimulated, the impulse is reflected back through the nerve cell along the motor nerve, causing action of the organ to which that nerve extends. All reflex actions are more or less complex and involve several nerves and often a number of nerve centers.

There are many illustrations of involuntary reflex action in ordinary life. The person sleeping will brush a fly from the face without awakening. If one steps upon a tack or other sharp object with the bare foot, the foot is withdrawn without any act of will and before the sensation has reached the brain. Reflex actions also occur through sight and hearing and have a similar effect upon the voluntary muscles, though it is usually general instead of local. One walking through the grass may be caused to jump by the sudden

appearance of some small animal, and one frequently jumps on hearing a sudden sound.

The chief centers for involuntary reflex action are the medulla oblongata and the spinal cord, but smaller centers are located in different parts of the body. Reflex acts of the spinal cord and cranial nerve centers are performed more quickly than voluntary acts, and they frequently preserve the body from injury. The time for a reflex act is from six-hundredths to eight-hundredths of a second.

The term reflex action is also extended to include conscious acts that have become automatic. In fact, from the viewpoint of the physiologist, nearly all acts contain a reflex element. See HABIT; NERVOUS SYSTEM; WILL.



REFORMATION, *reformation*, *reformation*, THE, a term applied to a revolt in Europe in the sixteenth century against papal supremacy and certain doctrinal tenets of the Church of Rome. For many centuries, western Europe had been a religious unit, under the primacy of the Pope, the Papal power being at one time almost absolute in temporal as well as in spiritual matters. As early as the fourteenth century, several of the princes and sovereigns of Europe refused the Pope the right to dictate in temporal or governmental affairs, but previous to the opening of the sixteenth century there had been comparatively few who denied the supreme and infallible authority of the Pope in matters touching religion. Among these few were Wycliffe, Huss and Jerome.

Causes. The causes leading to the sixteenth century reformation were many. The great intellectual awakening known as the Renaissance, or revival of learning, increased the number of scholars. The invention of printing scattered written works broadcast over Europe—not only the Bible, but the writings of men who had begun to doubt the scriptural authority for some of the doctrines and ceremonies of the Church, such as devotion to the Virgin Mary, the invoking of saints, confession to a priest, and the nature of the elements used in the sacrament of the Lord's Supper. These writings, of course,

led to questionings and criticism. In addition to these fundamental causes there was the need of a thorough reform within the Church itself—a need recognized by all earnest and spiritual-minded men, the only difference of opinion being the manner in which the work of purification should be effected. A fourth cause may be found in the feeling of jealousy with which the temporal princes regarded the Papal power.

Progress. The actual occasion of the outbreak of the Reformation, however, was the sale of indulgences in Germany. It has always been a tenet of the Catholic Church that indulgences remit penalties due to sin after severe repentance and aid of the sacrament of penance. Leo X, in 1513, desirous of completing the great temple of Saint Peter's, which Julius II had commenced, granted an indulgence to those who would contribute financial aid for the purpose. Johann Tetzel, to whom the archbishop of Magdeburg had delegated the power of dispensing indulgences in Saxony, carried out his commission in such a manner that wrong ideas about the effect of indulgences began to spread among the ignorant and credulous. Many intelligent Christians likewise opposed his methods.

Martin Luther, an Augustinian monk and teacher of theology in the University of Wittenberg, was foremost among those who denounced Tetzel. He appeared in the vicinity of Wittenberg at the time of the celebration of a yearly festival, when it was customary to post on the church doors bulletins of general interest to the parish, and nailed to the door ninety-five theses, warning the people against such persons as Tetzel and emphasizing the necessity of a penitent heart and a loving spirit in making gifts to the Church. Copies of these theses were scattered broadcast, and all the continent was soon plunged into a tumult of controversy. Luther, meanwhile, devoted himself to continued study of the Bible, Church history and canon law, in order to defend the position he had taken, and he drifted farther and farther from the Church. His public utterances and writings became bolder, and he soon began attacking the Church of Rome. He maintained that contrition, confession and absolution were not necessary to secure salvation, denied the infallibility of the councils of the Church, and asserted that the Bible was the only foundation of faith and that bishops, priests and formal worship were wholly unnecessary. Ow-

ing to his wide reputation for learning and piety, his opinions on these subjects influenced a great many people.

At first, Pope Adrian VI did not regard the matter as of serious import; but when convinced that Luther's influence was becoming dangerous, he urged the Diet of Nuremberg to institute determined action against him. The Diet, however, felt powerless to carry out the desire of the Pope, because of Luther's popularity with a number of the German princes. Frederick the Elector became his great patron. However, Luther's writings were condemned as heretical, and if he did not recant his errors in sixty days, he was to be seized and sent to Rome to be tried for heresy. Luther publicly burned the Pope's bull, to the general amazement of the people.

In 1521 Luther was summoned by Charles V to appear before the Diet of Worms and was called upon to recant his errors. Refusing to do so, he was conveyed privately to the Wartburg Castle by Frederick, elector of Saxony, where he lived in seclusion for a time and busied himself with the translation of the New Testament into German.

Alliances and Diets. On May 4, 1526, an alliance of the Protestant princes was formed at Torgau, under the leadership of John, elector of Saxony, and Philip, landgrave of Hesse. The Catholics formed a counter-alliance at Dessau, which emphasized a disunion that was destined to exercise an influence in every part of the world. The followers of Luther having become so numerous, Philip of Hesse convened a synod at Homburg in October, 1526, to systematize the doctrines and establish a rule of faith. A constitution was there formed which gave an individual congregation power to decide its own ecclesiastical rules. This was adopted in the several Lutheran states, in each of which the chief, or head, of the government was to be supreme in relation to the Church. To educate the younger element of the people, Luther wrote a catechism of a doctrinal character, which was extensively circulated. Because of a dread of Turkish power and a desire to ally, if possible, the dissensions which had arisen in relation to questions of an ecclesiastical character, a diet was held on April 19, 1529, at Spire. The Catholics submitted what they regarded as moderate claims. Against them the Lutherans protested, which was the origin of the name *Protestant*, that has since been

applied to Lutherans and other dissenters from the doctrines of the Roman Church.

In June, 1530, a diet was held at Augsburg, at which Emperor Charles V presided. It demanded from the Protestant princes a written confession of faith. A confession, written by Melancthon and approved by Luther, has since been known as the "Augsburg Confession." In 1555, in a diet at Augsburg, articles were framed giving each prince the right to choose between Lutheranism and Catholicism, the religion of the prince to be that of his people. Any prelate on becoming Protestant was to give up his benefice, and the subjects of ecclesiastical princes were to enjoy religious liberty. Thus the Lutherans first received legal recognition, but the issues between Catholics and Protestants were never satisfactorily adjusted until the Peace of Westphalia, which ended the Thirty Years' War, in 1648.

The doctrines of the German reformer found a willing adherent in Gustavus Vasa, who in 1523 became king of Sweden. Gustavus induced the estates of the realm, in the Diet of Westeras (1527), to sanction the confiscation of the monasteries, and he declared himself supreme in matters ecclesiastical. The last remains of Catholic usages were abolished at a second Diet of Westeras in 1544.

Denmark. The first systematic measures in favor of the Reformation in Denmark were taken by Frederick I, through the influence of his son Christian, who had studied in Germany and become an enthusiastic Lutheran. At a diet held in 1539, at which no member of the clergy was allowed to be present, the assembly decreed the abolition of the Roman Catholic worship in the Danish dominions.

Hungary and Poland. In Hungary, where numerous Germans had settled, bringing Lutheranism with them, the new faith for a short time made rapid progress, especially in the cities and among the nobles. In Poland the Reformation also found numerous adherents, but eventually the old faith dominated.

Italy and Spain. Both in Italy and in Spain, the idea of the Reformation at first gained some ground among scholars, but it never appealed to the masses of the people, and even among the scholars who were foremost in advocating certain reforms in the Church there was never any sympathy with the revolt against the Papacy. After the

Council of Trent and the subsequent Catholic Reformation, Protestantism practically disappeared from Southern Europe.

Swiss States. In the Swiss states, the progress of Protestantism was of much more importance. It found a leader in Ulrich Zwingli, a preacher at Zurich, who, by sermons, pamphlets and public discussions, induced that city to abolish the old and inaugurate a new Reformed Church, a course followed by Berne and other cities. Ultimately this movement was merged in political disensions between the Reformed and the Roman Catholic cantons, and Zwingli himself fell in battle (1531). Between Luther and Zwingli there were differences of opinion, chiefly concerning the Lord's Supper, in which the former showed considerable ill-nature toward his fellow reformers. *The Institutes of Calvin* formulated the doctrines of a large body of Swiss Reformers, who also accepted Calvin's ordinances regarding Church discipline. After many tedious contests, Calvin's creed was virtually accepted in the Netherlands and elsewhere.

France. In France the movement seemed at first to find powerful support, as Margaret, queen of Navarre, sister of King Francis I, and many of the higher ecclesiastics favored the reformed doctrine. The New Testament was translated into French, churches to the number of 2,000 were established by 1558, and the Huguenots, as the Protestants were called, formed a large religious party in the State. Unhappily, however, the religious element was mixed with political and personal hatreds, and in the civil strifes before and after the Massacre of Saint Bartholomew (1572) the religious movement declined. The giving up of Protestantism by Henry IV (1593) was a blow to the Huguenots, and though they obtained toleration and certain privileges by the Edict of Nantes, this was finally revoked in 1685.

England. The Reformation in England was only indirectly connected with the reform movement in Germany. Wycliffe and the Lollards, the revival of learning, the writings of More, Colet and Erasmus, the martyrdom of Thomas Bilney, had all combined to render the doctrine and discipline of the Church unpopular. This feeling was greatly increased when the writings of Luther and Tyndale's translation of the Bible found eager readers. The political element came to favor the popular reform movement when Henry VIII, in

his efforts to obtain a divorce from Catharine, found it necessary to repudiate the Papal supremacy and declare himself by act of Parliament (1534) the supreme head of the Church of England. To this the Pope replied by threats of excommunication, which were not, however, immediately executed; yet the breach with Rome was complete, so far at least as the king was concerned. Under the new laws of supremacy and reason, several of the clergy suffered at Tyburn. Sir Thomas More and Fisher, bishop of Rochester, were beheaded at Tower Hill, and the lesser and greater monasteries were suppressed.

At this time there were three chief parties in the State: the party which still held the Pope to be the supreme head of the Church; the king's party, which rejected Papal authority but retained the Roman Catholic faith, and the reform party, which rejected both the authority and the doctrine of the Roman Church. So far as Henry VIII himself was concerned, the changes made were not due to religious convictions, for in 1539 we find him passing the statute known as the *Six Articles*, which rendered it a penal offense to deny the doctrine of transubstantiation or to affirm that priests might marry, yet he allowed the publication of the *Litany* and some forms of prayer in English.

With the accession of Edward VI, the Reformation movement made considerable progress. In 1549 the First Act of Uniformity enjoined on the Church the use of Crammer's *First Book of Common Prayer*, and in 1551 the faith of the reformers was summed up in the *Forty-two Articles of Religion*, which in the reign of Elizabeth were reduced to the *Thirty-nine Articles of the Church of England*. They deny purgatory, reduce the original seven sacraments to two, endorse the Lutheran doctrine of justification by faith alone, repudiate Papal jurisdiction and constitute the sovereign the supreme head of the Church. Thus, England in religion became detached from the see of Rome.

Scotland. In Scotland the first great Protestant reformer was Patrick Hamilton, after whose death, in 1528, George Wishart took up the work and was followed by John Knox, who finally became the leading spirit of the Reformation in Scotland. By 1560 the new faith was firmly established in the country, episcopacy was abolished and the Reformed Church set up, differing in every respect as greatly as possible from the Church of Rome.

The doctrines of the Church were formulated by Knox in a creed known as the *First Book of Discipline*, which was adopted by the General Assembly of the Church.

Results of Reformation. Thus Protestantism, the ultimate expression of the Reformation, took root permanently only in Northern Europe, while Latin Europe, Italy, Spain, France and Austria, remained essentially Catholic countries. The effect of the Reformation in the Roman Catholic Church itself was on the whole good, for it compelled its attention to acknowledged abuses which greater vigilance and a more perfect supervision have now removed.

Related Articles. Consult the following titles for additional information

Augsburg Confession	Melanchthon, Philip
Bull	Nantes, Edict of
Calvin and Calvinism	Peasants' War
Charles V	Pope
Eck, Johann M	Protestants
England, Church of	Renaissance
Erasmus, Desiderius	Roman Catholic Church
Huguenots	Thirty Years' War
Huss, John	Wycliffe, John
Indulgence	Zwingli, Ulrich
Knox, John	
Luther, Martin	

REFORMED CHURCH, in general, those churches which arose at the time of the Reformation; specifically, Protestant churches which did not embrace the doctrines and discipline of Luther. The title was first assumed by the French Protestants, but afterward it became the common designation of all the Calvinistic churches on the European continent. In America there are four Protestant denominations which use the name Reformed. These are the Dutch Reformed, the German Reformed, the Christian Reformed and the Hungarian Reformed. Their combined membership is about 484,000.

REFORM SCHOOLS. In many countries, instead of imprisoning boys and girls arrested for misdemeanor, the state places them in institutions where they may have moral guidance and an opportunity to reform and fit themselves for lives of usefulness. They are known as reform, or industrial, schools. What to do with young delinquents came to be a serious problem for reformers early in the nineteenth century, and as early as 1824 the House of Refuge on Randall's Island, New York, was established as a private institution. This was followed by other similar schools, and in 1876 the first state reform school was founded, at Elmira, N. Y. This institution won worldwide attention, and soon led to the establishment of others.

The fundamental idea of all reform schools is not to punish, but to reform, the offender; to promote his physical and mental development and to give him such industrial training as will enable him to support himself after his release. In the beginning of the movement only adolescent boys and girls—about fifteen or sixteen years old—were taken into the reform schools; to-day provision is made for young women and young men up to the age of thirty. Thanks to the indeterminate sentence, the young man or young woman who, through diligence and good behavior, is promoted to the highest grade, is released on parole and given an opportunity to make good in the world. It is said that eighty per cent of those who are thus released afterwards lead upright lives.

REFRACTION. If a stick is thrust into water it appears to be bent at the surface of the water (see illustration, article **LIGHT**). A spoon placed in a cup of clear tea presents a similar appearance. These appearances illustrate the principle of refraction of light. The rays in passing from air into water are entering a denser medium, and are bent out of their straight course, or refracted. The eye follows the course of the bent ray and seems to see a crooked stick or spoon. The law of refraction is as follows: Light passing from a rare to a dense medium is bent towards a line perpendicular to the surface of the refracting body. Light passing from a dense to a rare medium is bent from a perpendicular to the surface of the refracting body. Only when a ray travels through a uniform medium does it follow a straight path.

Among the common phenomena due to refraction are the apparent shallowness of a vessel when filled with water, the magnifying power of lenses, the rainbow and the beautiful rainbow tints on the horizon at sunrise and sunset. Since the lower layers of the atmosphere are more dense than the upper layers, rays of light passing horizontally through the atmosphere are bent downward, and, since we see the object in the direction of the refracted ray, we see the setting sun after it is below, and the rising sun before it is above, the horizon.

Related Articles. Consult the following titles for additional information.

Light	Polarization of Light
Mirage	Rainbow

REFRIGERATION, *refrij'er d'shun*. See **COLD STORAGE**.

REGELATION, *reje la'tion*. When two blocks of moist ice are brought into contact under pressure they will freeze together, though the temperature is above the melting point. This occurs not only in the air but also in water having a temperature as high as 100° F. The term *regelation*, meaning *refreezing*, is applied to this phenomenon, for which the following explanation is usually advanced: The ice melts at the plane of contact, and the water formed freezes when the pressure is relieved. Thus the two pieces are welded together. That the melting point is lowered as the pressure increases is a well-known law of physics. The theory of regelation is considered of value in explaining the formation of glaciers. See **GLACIER**.

REGENT, *re'jent*, in a broad sense, a person who governs; specifically, one who governs during the minority, absence or disability of a king or queen. In most countries where the ruling power is hereditary the duties of regent usually devolve upon the nearest relative of the sovereign who is capable of undertaking them. In the English universities the term *regent* is given to a member of the governing body of the institution. In many states of the United States and Canadian provinces the term is applied to officers having the direction of state or provincial colleges and universities.

REGIMENT, *rej'i-ment*, a body of regular soldiers forming an administrative unit of an army. The size of the regiment depends upon the class of troops forming it. For instance, a regiment of cavalry is not usually as large as one of infantry. Since the regiment of infantry is the standard for organization, a description of that will give a good idea of the organization of all. In the armies of Great Britain, France and Germany, at the beginning of the World War, a regiment of infantry numbered about 3,000 soldiers, besides officers. The regiment was divided into battalions of about 1,000 men, each battalion including four companies. The regiment is commanded by a colonel, and the battalion by a lieutenant-colonel. The companies are commanded by captains. For the United States army, see **ARMY**, subhead, *Units of Army Organization*.

REGINA, *re ji'na*, **SASK.**, fourteenth city in size in Canada, capital of the province, is located on the Canadian Pacific and Canadian Northern railways, about one hundred miles north of the international

boundary. It has large manufacturing establishments, including flour mills, sash and door factories, machine shops, soap works and wire and steel works. The city also has six large grain elevators and is a distributing point for wholesale groceries, hardware, furniture, builders' supplies and machinery of various kinds. Among the city's prominent buildings are the Parliament building, two hospitals, the Y. M. C. A. and Y. W. C. A., the public library and the new Hudson Bay Company's building, estimated to cost \$2,000,000. Regina is a headquarters for the Royal Canadian Mounted Police and the provincial courts. Several million dollars' worth of property was destroyed and many lives were lost in the cyclone which devastated the city on July 1, 1912. Population, 1921, 34,432; 1931, 53,209.

REGISTRATION. Registration is of two sorts, registration of voters and registration of births, deaths and marriages.

Registration of Voters. Registration of voters is for preventing voting by those who are not legally qualified. In large cities this registration is formal and exacting, and is conducted by the boards of election in the voting precincts. In American communities when a voter registers he is required to give his name and residence, to state how long he has resided at his present place of residence, how long he has resided in the precinct, in the county, in the state and in the United States. Permanent registration, rather than one at stated periods, prevents frauds. Under this plan, voters identify themselves by their signatures.

Registration of Births, Deaths, and Marriages. Registration of births, deaths and marriages is required in nearly all countries. Physicians are required to send to the designated authorities records of all births and deaths, and clergymen performing marriage ceremonies are required to send records of these ceremonies. Marriage licenses are also required in most states, and these are recorded when issued. Registration provides a valuable record which is often consulted by courts of law; it furnishes every country with vital statistics, and serves as a check on immorality.

REICHSTADT, *riKé'stadt*, **NAPOLEON FRANÇOIS JOSEPH BONAPARTE**, Duke of (known as Napoleon II) (1811-1832), the only son of Napoleon and Empress Maria Louisa. On his abdication, following the

Battle of Waterloo, Napoleon declared the infant prince his successor. The Senate, however, took no notice of Napoleon II, whereupon Maria Louisa took him to the court of his grandfather, Francis I of Austria. By the Treaty of Paris, Napoleon II was barred from inheritance, but was later made the Duke of Reichstadt, with the rank of an Austrian prince. He was never strong, and died of overexertion at the age of twenty-one.

REICHSTAG, *riKestahg*, (German *Reich*, a kingdom, and *Tag*, a day), the name of the lower house of the German Parliament as it existed from 1871 to 1918. The members of the Reichstag were elected by popular vote, and all measures had to have their approval to become laws. In 1919 the Reichstag became the legislative body of the new German republic. When Adolf Hitler became German Chancellor, the Reichstag, at his order, set aside the Constitution (1933) and gave absolute power to him and his Cabinet, clothing him with all the authority of a dictator. Only one political party, the National Socialist, is permitted in Germany; the Reichstag members necessarily all belong to that party, and they are pledged to the will of the dictator. See GERMANY; HITLER, ADOLF.

REID, WHITELAW (1837-1912), an American journalist and diplomat, born at Xenia, Ohio. He graduated at Miami University in 1856, taught school for two years and then entered upon a journalistic career, becoming editor of the *News*, in his native town. In 1868 he became an editorial writer on the staff of the *New York Tribune*, and four years later, upon the death of Horace Greeley, owner of that paper. In 1889 President Harrison appointed him United States minister to France; in 1892 he was the unsuccessful nominee for Vice-President, on the ticket with Harrison. Reid was special ambassador of the United States at Queen Victoria's Jubilee in 1897, was one of the American peace commissioners to Paris in 1898 and his country's representative at the coronation of King Edward VII in 1902. He was appointed by President Roosevelt ambassador to England in 1905, which post he held with distinction until his death.

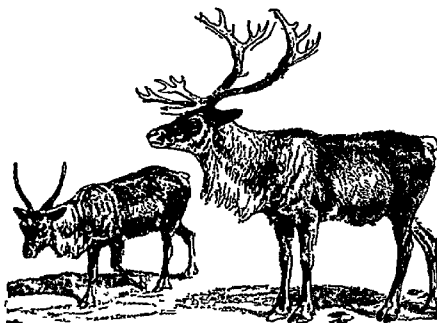
REIGN OF TERROR. See TERROR, REIGN OF.

REIKJAVIK. See REYKJAVIK.

REINDEER, *rain'deer*, a deer found in the northern parts of Europe and Asia. In

North America the family is represented by the *caribou*. The reindeer is about four feet high at the shoulders and has a thick, square body; its legs are shorter, in proportion to its body, than those of the red deer. The size varies somewhat, according to climate, the reindeer of the Arctic regions being larger than those found farther south. The feet are large and broad and enable the animal to travel easily over the snow. The head carries a pair of large, branching antlers, which are shed each year.

The reindeer is one of the most important domestic animals. To the inhabitants of Northern Europe and Siberia it is the beast of burden of the Arctic region. Its flesh furnishes meat, and from its milk cheese is made. In summer the meat is preserved by



REINDEER

drying. The skins furnish material for clothing, and from the antlers and bones numerous utensils are made. The animal is keen of sight and swift of foot and will maintain a speed of nine or ten miles an hour for a long time. It can easily draw a sledge with a weight of 200 pounds. The reindeer lives upon twigs, grass and lichens, which it secures by pushing the snow aside with its nose and fore feet.

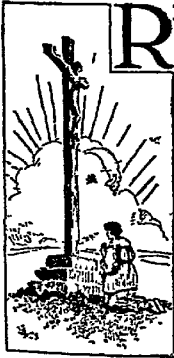
When Alaska was opened for settlement and exploitation, white men killed such numbers of caribou and other large game that the Eskimos were threatened with starvation. To remedy this condition in 1892 the United States government, through the Bureau of Education, imported 1,200 reindeer from Siberia, and the Bureau engaged a number of Laplanders to teach the natives how to care for the animals. The experiment succeeded beyond the most sanguine expectations, and

there are now about 350,000 of these valuable animals in the territory. The income to the natives, exclusive of what they use for themselves, is increasing year by year. Some of the Aleutian Islands have been set apart by the United States government as reserves for the raising of reindeer, so that the supply of these animals will be adequate to meet the demands of the increase in population in Alaska. See CARIBOU; DEER.

RELATIONSHIP. Personal and legal relationships are of two classes: those of blood, that is, the relationship which exists between two persons descended from the same ancestor, known as *consanguinity*, and those of *affinity*, or marriage, that is, the relationship which exists between the husband or wife and the kindred, by blood, of the other. The wife's kindred by blood bear the same relation to the husband by affinity that they bear to her by consanguinity; thus, the wife's sister is said to be the sister-in-law of the husband. Relation by affinity disqualifies judges, jurors or witnesses, equally with relation by consanguinity. The term *relationship* is sometimes employed to include all who are entitled to share in the estate of a deceased person.

RELATIVITY, THEORY OF. See EINSTEIN, ALBERT

RELIEF, *re leaf*. See ALTO-RELIEVO; BAS-RELIEF; MEZZO-RELIEVO.



RELIGION, *re lij' un* Many definitions of religion have been given, and while none seems to be entirely satisfactory, it is generally agreed that religion treats of man's relation to a supreme power, and his method of expressing that relation in worship.

All men are religious. No tribe has been found so low in savagery or barbarism that it did not acknowledge some relation

to a supreme being and in a crude way try to give expression to that relationship. All religions can be classified under two great divisions—those whose followers recognize but one supreme being (monotheistic); those whose followers recognize a number of gods (polytheistic). A more satisfactory classification is that given by Jastrow, who distinguishes four great divisions:

1. The religions of savages
2. The religions of primitive culture, such as those of the ancient Mexicans and Peruvians, and those of the South Sea Islanders
3. The religions of advanced culture, such as those of Egypt, Babylonia, Assyria, Greece and Rome
4. The religions coextensive with life, such as Judaism, Buddhism, Mohammedanism and Christianity.

Religions of the first and second groups are characterized by the worship of objects of nature, such as the heavenly bodies, mountains and streams, and the worship of the spirits of ancestors. Magical rites and ceremonies form an important part in this worship, and the priest is a medium of communication between the gods and man. In religions of the third group, mythology takes the place of magic, and the priesthood begins to guard the morals of the people. Religions of the fourth group, those which are coextensive with life, exert the greatest influence over the individual and over the race. These religions emphasize the spiritual nature in man, and the importance of man's relation to the divine. Their followers are required to follow high ethical standards. The nations in which Christianity is the prevailing religion have exerted the greatest influence over human history.

Great Religions of the World. In the following table are shown the number of followers of the world's principal religions:

RELIGION	NUMBER OF FOLLOWERS
Christianity	558,000,000
Confucianism and Taoism	350,000,000
Hinduism	230,000,000
Mohammedanism	218,000,000
Buddhism	150,000,000
Judaism	16,000,000
Animism	135,000,000
Shintoism	25,000,000
Unclassified	51,000,000

Related Articles. Consult the following titles for additional information.

Abbot	Articles, The	Cathedral
Abolition	Thirty-nine	Censer
Advocists	Atheism	Chaplain
African	Atonement	Charity, Sisters of
Methodist	Ave Maria	Christian
Episcopal	Baptism	Endeavor, United
Church	Baptists	Society of
Agnosticism	Baptist Young People's Union	Christianity
Allah	Benedictines	Christian Science
Alpha and Omega	Bishop	Christmas
America Society	Brahma	Church
Anabaptists	Brahmanism	Conclave
Ancestor Worship	Breviary	Concordat
Angel	Buddha	Congregationalists
Anglican	Buddhism	Counter-Reformation
Church	Bull	Covenanters
Antipope	Canon Law	Creed
Apostles	Canonization	Cross
Apostolic Succession	Capuchins	
Archbishop	Cardinal	
	Carthusians	

Deaconess	Immortality	Presbyterians
Dervish	Indulgence	Priest
Devil	Islam	Protestant
Devil Worship	Jehovah	Purgatory
Disciples of	Jesuits	Quakers
Christ	Jesus Christ	Rabbi
Dominicans	Jews	Reformed
Druids	Koran	Church
Dukhobors	Lamaism	Religious
Dunkers	Latter Day	Liberty
Easter	Saints	Resurrection
Epiphany	Lent	Roman
Bishopal	Litany	Catholic
Church	Liturgy	Church
Epworth	Lutherans	Rosary
League	Magi	Sacrament
Eucharist	Magnificat	Sacred College
Evangelical	Martyr	Sacrifices
Alliance	Mass	Salvation
Evangelical	Mendicant	Army, The
Association	Orders	Seventh Day
Fasts and	Mennonites	Adventists
Fasting	Mercy, Sisters	Shakers
Fatalism	of	Shamanism
Fire Worship	Messiah	Shites
Foreordination	Methodists	Shintolism
Franciscans	Missal	Sunday Schools
Free	Missions	Synagogue
Methodists	Mohammedan-	Talmud
Freethinker	ism	Taoism
Gentiles	Monasticism	Theosophy
Ghebers	Monk	Trappists
God	Moravian	Trinity
Greek Church	Brethren	Union
Hadj	Mormons	Unitarians
Heaven	Mysticism	Universalists
Hegira	Nature Wor-	Ursulines
Hell	ship	Vatican Coun-
Heretic	Nonconformists	cil
Hermits	Nun	Vicar
Hierarch	Nuncio	Volunteers of
High Priest	Pantheism	America
Holy Ghost	Parsees	Wesleyan
Holy Water	Paulists	Methodists
Holy Week	Penance	Zionist
Huguenots	Polytheism	Movement
Hussites	Pope	
Idol	Predestination	

RELIGIOUS LEADERS

Blavatsky, Helen P.	Melanchthon, Philip
Booth (family)	Mohammed
Calvin and Calvinism	Moody, Dwight Lyman
Confucius	Savonarola
Eddy, Mary Baker	Smith, Joseph
Fox, George	Sunday, William A.
Guss, John	Swedenborg, Emanuel
Hutchinson, Anne	Wesley, John
Jesus Christ	Williams, Roger
Knox, John	Wycliffe, John
Loyola, Saint Ignatius	Young, Brigham
of	Zoroaster
Luther, Martin	Zwingli, Ulric

RELIGIOUS, *relijus*, LIBERTY, the right of every one to form his religious opinions and to express them in worship without interference from the state. Among the nations of ancient times the idea of religious liberty was almost totally lacking, the individual being subject to the king in religious as well as in civil matters. During the early centuries of the Christian Era the Christians were frequently persecuted, and not until after the conversion of Emperor Constantine was full toleration of religious worship granted to all persons. In A. D. 313 he published an edict establishing Christianity as the state religion of the Roman Empire.

Previous to the Protestant Reformation the authority of the Roman Catholic Church

was almost universally recognized throughout Europe, and the question of religious liberty did not arise. The Reformation did not directly introduce the question, since every ruler, Catholic or Protestant, believed that unity of faith among his subjects was necessary to the integrity of the state. Religious liberty is the outgrowth of the gradual broadening of men's minds through education, travel and perfection of means of communication. It received its first great impetus with the emigration of the Pilgrims to America; the first amendment to the American Constitution provides that Congress shall make no law respecting the establishment of religion. The spirit of tolerance developed in America has exerted a strong influence on other nations, yet intolerance under dictatorial rule is not unknown today.

REMBRANDT, *rem'brant* (1608-1669), whose full name was **REMBRANDT HARMENSZ VAN RIJN**, was the greatest painter and etcher Holland has produced and one of the supreme masters of all time. He was born at Leyden. At the age of twenty-five he went to Amsterdam, where he spent the rest of his life.

Rembrandt was remarkably prolific and versatile. His subjects include portraits, religious and classical themes and landscapes, and he was equally successful as a painter and as an etcher. As the first real Dutch master of naturalistic portraiture Rembrandt quickly acquired a wealthy and distinguished patronage, and his portraits are valuable not only as supreme works of art, but also as records of his time. He reserved much of his time from this profitable labor and painted numerous portraits of himself and of members of his family, including his beautiful wife, Saskia, to whom he was married in 1634. He also executed scores of other masterpieces, which are now among the chief treasures of the great galleries.

His most famous work, *The Night Watch*, a large composition of twenty figures representing the civic guard of his city leaving



REMBRANDT

their clubhouse, is in the Royal Museum at Amsterdam. In the same museum is *The Syndics of the Drapers*, a lifelike and beautiful group of seventeenth century Dutch merchants. Among other important canvases are *The Anatomy Lesson*, with its masterly comparative treatment of living and dead human flesh; *The Supper at Emmaüs*, an equally startling study of contrasted qualities, in which the natural and supernatural are shown side by side. *The Old Woman Cutting her Nails*, *The Auctioneer* and several other important works are owned by the Metropolitan Museum, New York, and a fine *Portrait of a Girl* is prominent in the collection of old masters of the Chicago Art Institute. *The Mill*, perhaps the best of his landscapes in color, belongs to the Widener collection, Philadelphia. In addition to these famous works, Rembrandt painted about 275 other canvases and did 320 etchings; and of these last the most notable are *The Descent from the Cross*, *Christ Healing the Sick* and *The Burgomaster Jan Six*.

As a master of chiaroscuro (the disposition of light and dark in a picture) Rembrandt has no equal. His figures were faultlessly modeled and full of life; his color rich, transparent and glowing. In all his work there is a vivid realism combined with poetic feeling and grace.

REMINGTON, FREDERIC (1861-1909), an American sculptor, painter and writer, who vividly portrayed the picturesque life of the Western plains. He was born at Canton, N. Y., and after studying art in New York City, traveled west, where he spent much time living the life of a cowboy and camping with Indians. In time he acquired a unique reputation by writing and illustrating stories of cowboys and red men. In his landscapes are the warm colors of mountain, plain and desert; in his figures the vigor and energy of the sort of men who inhabit such regions. One of his best paintings, *Cavalry Charge on the Southern Plain*, is owned by the Metropolitan Museum, New York. The same museum has his two bronze statuettes, *Bronco Buster* and *Wounded Bunkie*. His books, which he illustrated, are entitled *Pony Tracks*, *Crooked Trails* and *The Way of an Indian*.

REMSEN, IRA (1846-1927), an American chemist and educator, born in New York City. He was educated in the College of the City of New York, the College of Physicians and

Surgeons and the universities of Munich and Göttingen. At the age of twenty-six he became professor of chemistry and physics in Williams College, at Williamstown, Mass. When Johns Hopkins University was founded in 1876, he was chosen to organize the department of chemistry, which became one of the best, not only in America, but in the world. He was president of that university from 1901 to 1912, when he resigned to resume his research work in chemistry. Dr. Remsen's work has given him a wide reputation, and his books have been translated into several languages. Among his best known books are *Theoretical Chemistry*, *Organic Chemistry*, *Introduction to Chemistry* and *The University Movement*.

RENAISSANCE, *ren na sahNs'*, a French word meaning *new birth*, a name given to the movement in Europe that inspired men to abandon the restraints of the Middle Ages and to develop modern interests, enthusiasm and ideals. Its most noted feature was the *Revival of Learning*, an awakening of mind and a thirst after the new knowledge. This resulted in numerous investigations of natural events, in a wide-spread study of art and literature and in a broadening of outlook to a degree never before known.

Before the fifteenth century clergymen were the only educated class. They were accepted as authority on all subjects. But in the New Birth men all over Europe began to think for themselves. Many learned men came from the East into Western Europe, bringing literature and other treasures, after the fall of Constantinople (1453). They helped very greatly in developing the new thirst for knowledge and the appreciation of human interests, although these men were not the direct cause of the Renaissance as some writers suppose. The birth of new ideas and an eagerness in using them grew out of many preceding conditions that slowly developed through the centuries, particularly in the fourteenth century.

Indeed the Middle Ages had a civilization and culture of their own. This culture was imprisoned by ancient customs and numerous wrong notions. The Renaissance upset these traditions at many points, and by using certain old ideas built up a new civilization.

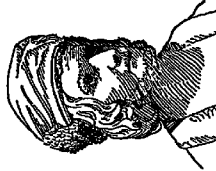
The Renaissance did not consist so much in a change of subjects of study as it did in setting up a new viewpoint from which well-known facts may be considered. Lan-



RAFAEL - 1483 - 1520



COPERNICUS - 1473 - 1543

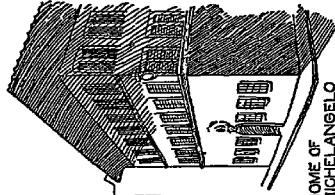
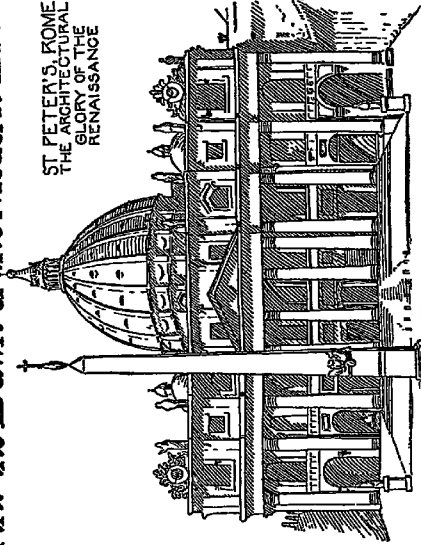


COLUMBUS - 1445 - 1506

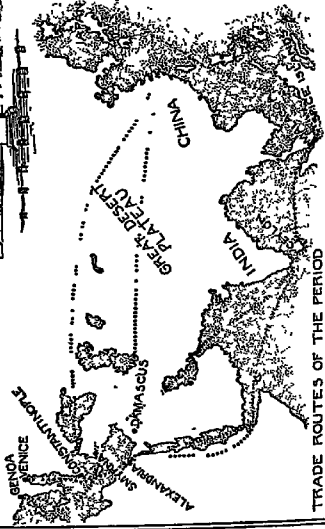
THE RENAISSANCE

The "New Birth": the Dawn of the Modern Era

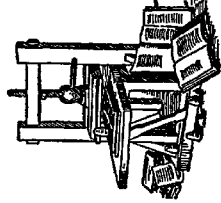
ST. PETER'S, ROME
THE ARCHITECTURAL
GLORY OF THE
RENAISSANCE



HOME OF
MICHELANGELO
FLORENCE, ITALY



TRADE ROUTES OF THE PERIOD



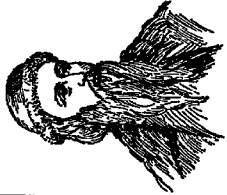
GUTENBERG'S
PRINTING PRESS
ABOUT 1470



PETRARCH - 1304 - 1374



ERASMUS - 1467 - 1536



GUTENBERG - 1400 - 1468

guages, philosophy, art, government and religion were studied as fields in which to make discoveries and critical comparisons.

Although theoretical purposes at first ruled the movement men came to see its value in promoting progress and so later made a multitude of practical applications of the new learning

The new curiosity brought out new facts and so led to a rejection of many errors about the natural world, students gave scant attention to mere opinions and learned to make direct observations. Then the foundations of modern science were laid.

Humanism also arose. This means a very high regard for the facts pertaining to the human race. Shallow ideas about human nature and man's place in society melted away and man was then viewed as a living, inspiring subject for direct observation and study.

A self-sacrificing devotion to Greek and Latin studies brought later great enlargement to all modern languages and literatures. Raphael, Da Vinci, Titian, Corregio and others produced works of art that have never been surpassed.

In philosophy Bruno and other thinkers threw off the chains of cramped intellectual masters for the sake of gaining a free, ancient but pagan viewpoint. This new position proved unsuitable in the end, but it served at the time as a means of escape, a necessary step in the direction of modern philosophy.

The Renaissance gradually reached all parts of Europe and finally modified all phases of social life. It developed new arts such as printing, new conceptions of our earth through geographic discoveries, new national policies as in the cultivation of trade by sea, new church life through the Reformation. It brought inspiration, light and joy to those who delighted in art, learning and adventure. However, the neglected masses of peasants were long in gaining any relief from their miseries.

Related Articles. Consult the following titles for additional information

Ariosto, Ludovico	Luther, Martin
Boccaccio, Giovanni	Medici
Calvin and Calvinism	Melancthon, Philip
Cervantes, Saavedra	More, Sir Thomas
Copernicus, Nicholas	Petrarch, Francesco
Durer, Albrecht	Raphael, Santi
Erasmus, Desiderius	Reformation
Galileo	Sarto, Andrea
Ghiberti, Lorenzo	Tasso, Torquato
Holbein, Hans	Wycliffe, John

RENAN, re nah'N', ERNEST (1823-1892), a French philologist, historian and essayist born at Tréguier, in Brittany, and educated for the priesthood at the seminary of Saint Sulpice, Paris. In 1845, however, he gave up all intention of becoming a priest and devoted himself to historical and linguistic studies. In 1862 he was appointed professor of Hebrew in the Collège de France, but his unorthodox views on religion led to his dismissal. In 1863 his *Life of Jesus*, the work by which he is most widely known, appeared. This book gave rise to prolonged discussions throughout Europe. It was the first of a series of volumes setting forth Renan's views on the history and origin of Christianity. The most important of these volumes are *The Apostles*, *Saint Paul*, *The Christian Church*, *The Antichrist* and *Marcus Aurelius*. Renan was highly honored as a scholar.

RENI, ra'ne, See GUIDO RENI.

RENO, Nev, the county seat of Washoe County, thirty-one miles north of Carson City, on the unnavigable Truckee River and the Truckee-Carson Canal, and the Southern Pacific, the Virginia & Truckee and the Western Pacific railroads. There are two airports and numerous bus lines. It is in a farming, mining and stock-raising section, and is the largest city and the most important industrial center in the state. It is the seat of the state university, a hospital for the insane, and has, also, a Carnegie Library, a Y M C A building and a Federal building. Reno holds a unique reputation for its facilities providing for easy divorce. Reno was settled in 1858, was incorporated in 1869 and chartered as a city in 1901. Population, 1930, 18,529.

RENT. One of the most eminent American economists defines rent as "that which is paid for the use of land," but in the sense in which it is commonly used, it means that which is paid for the use of buildings as well as for the use of lands. When the land upon which the building stands belongs to one owner and the building to another, the rent is divided. This condition frequently exists in large cities where a long-term lease, as for ninety-nine years, is made, and a building is erected upon the plot in question. At the expiration of the lease the building may become the property of the proprietor of the land, or the lease may be renewed.

The principal factors that determine the rent on land are quality and location. Ten acres of fertile alluvial land bordering on

a river will produce much larger crops than the same number of acres on a sandy hillside; therefore the first field would rent at a correspondingly higher rate. But location is sometimes the more important factor. Location includes certain inseparable appurtenances, such as climate and convenience to market. A field, located, for instance, on the north side of a hill will not receive as much benefit from the sun as one located on the south side, and will not produce as large crops. A man owns two farms of 160 acres each, and equally fertile; one is located within fifty miles of a large city, the other in North Dakota. It is obvious that the first farm is the more valuable, because of its proximity to a good market. It will, therefore, rent for more than the second. Location, especially with reference to convenient transportation and to business centers, is the chief factor in fixing the high rents paid for ground and buildings in cities.

Rent is usually payable in monthly installments, but a tenant on a farm may arrange with his landlord to pay at such times as he markets his produce. In cities and towns, rent on houses and other buildings is payable in advance. A tenant who is in arrears on his rent, may, after due notice, be ejected from the premises. See LEASE; TENANT.

REPLEVIN. See WRIT.

REPRESENTATIVES, HOUSE OF, the lower branch of the Congress of the United States, the other being the Senate. The House and the Senate are organized according to Constitutional provision; the former is much the larger body and is supposed to be closer to the people than is the Senate. That there should be direct responsibility to the people was the intention of the founders of the government, for members of the House from the beginning have been elected directly by the people for a short term of two years. In contrast, the Senators were given terms of six years, and because it was the plan that they should represent the states, the Constitution provided that they should be elected by the state legislatures. This method of selection was changed, however, by the adoption of the Sixteenth Amendment.

Number and Apportionment. The House itself determines the number of its members, and these are apportioned among the states according to population. After each national census determines the nation's population, the number of members for the following ten

years is decided, and the whole population is divided by this number; thus the unit of representation is found.

In 1921 it was decided that there should be 435 Representatives for the period from 1923 to 1933, and in the latter year the same number was continued until 1943. The total population divided by 435 disclosed that there should be one Representative to each group of 282,241 people. The population of each state was then divided by this unit of representation to determine how many Representatives the states should elect. As soon as each state learned its number its various counties were divided into a like number of Congressional districts, each district choosing its Representative by direct ballot.

There is no law requiring a member to reside in the district from which he is elected; the Constitution provides only that he must be a resident of the state. However, the people always choose in each district a resident of the district.

This is a brief statement of the manner in which Representatives are apportioned among the people. It should be stated, however, that a state, no matter how small its population, is entitled to at least one Representative. Any new state admitted during a decade adds to the total membership of the House. The following table gives the number of representatives by states:

Alabama	9	Nebraska	5
Arizona	1	Nevada	1
Arkansas	7	New Hampshire	2
California	20	New Jersey	14
Colorado	4	New Mexico	1
Connecticut	6	New York	45
Delaware	1	North Carolina	11
Florida	5	North Dakota	2
Georgia	10	Ohio	8
Idaho	2	Oklahoma	3
Illinois	27	Oregon	2
Indiana	12	Pennsylvania	34
Iowa	9	Rhode Island	2
Kansas	7	South Carolina	6
Kentucky	9	South Dakota	2
Louisiana	3	Tennessee	9
Maine	2	Texas	21
Maryland	6	Utah	2
Massachusetts	15	Vermont	1
Michigan	17	Virginia	9
Minnesota	9	Washington	6
Mississippi	7	West Virginia	6
Missouri	13	Wisconsin	10
Montana	2	Wyoming	1

How Elected. The Constitution did not declare what class of people should be qualified to vote for Representatives, it left these qualifications to be determined by each state, by ordering that any person a state permitted to vote for state representative should be permitted to vote for a Representative in Congress. Thus it occurs that in many states

men and women not yet citizens of the United States, but who have made their application for naturalization, are qualified.

Powers of the House. In the article CONGRESS OF THE UNITED STATES a list of the powers of Congress is given. The powers of the House and Senate are coordinate in almost all respects; joint action of the two Houses is nearly always required to give effect to their actions. However, all bills for raising revenue (referring to tariff and other revenue measures) must originate in the House of Representatives, on the theory that the House is closer to the people. Such bills, once introduced in the House, may be altered by the Senate, and then joint action follows.

The House enjoys another special function. It considers all charges relating to impeachment of Federal officers, and votes impeachment when the facts warrant such action. The Senate then sits as a jury to try the case.

Officers and Salaries. The House chooses its officers, chief of whom is the Speaker. Other officers are a sergeant-at-arms, doorkeepers, clerks, postmaster, etc. The Speaker need not be a member of the House, but one never has been chosen from outside the membership. The members receive \$10,000 per year, except the Speaker, whose salary is \$15,000, the same as that of the Vice-President, the presiding officer of the Senate.

Election. The members are elected on the first Tuesday after the first Monday in November of even-numbered years. Their terms formerly began on the 4th of the following March, at noon, but this date was changed to January 3 by the Twentieth Amendment to the Constitution, adopted in 1933, effective with succeeding Congresses.

State House of Representatives. The lower house of each state legislature is patterned closely after the national body. The members are usually elected for two years, from state representative districts, but in some states the term is four years.

Related Articles. Consult the following titles for additional information

Congress of the United States	Impeachment
Constitution of the United States	Senate of the United States
	Speaker

REPRIEVE, *re preev'*, the suspension of the execution of sentence passed upon a criminal for a capital offense. The power to grant a reprieve is usually exercised by the

chief executive of a state. When the legality of a conviction is questioned, or when there is alleged fresh evidence of the condemned person's innocence which seems worthy of examination, a reprieve is justified.

REPTILES, *rep'tilz*, that class of animals that includes snakes, lizards, turtles, crocodiles and alligators. Reptiles are cold-blooded vertebrates, and their bodies are covered with scales, except in case of the turtles, which have a shell for covering and protection. They wriggle along on the belly or crawl on short legs. In their internal structure and methods of reproducing their kind, reptiles bear a close resemblance to birds, and in a past geological age there were flying reptiles which seemed to form the connecting link between these two great classes in the animal kingdom (see PTERODACTYL). Reptiles breathe through their lungs during the entire period of their existence. In nearly all species the young are produced by eggs.

Geology shows that at one time the earth was inhabited by many species of gigantic and terrifying reptiles which have long since ceased to exist, and in general the class may be said to be disappearing.

Related Articles. Consult the following titles for additional information:

Adder	Copperhead	Lizard
Alligator	Crocodile	Milk Snake
Anaconda	Dragon	Moccasin Snake
Asp	Garter Snake	Monitor
Black Snake	Cavial	Python
Blindworm	Gecko	Rattlesnake
Boa	Gila Monster	Terrapin
Box Tortoise	Glass Snake	Tortoise
Chameleon	Iguana	Turtle
Cobra	Leatherback	Viper

REPUBLIC. See GOVERNMENT, subhead *Republic*

REPUBLICAN PARTY, a political party organized in the United States between 1854 and 1856. It was formed by the union of various parties and groups opposed to the extension of slavery. Among these were anti-slavery Whigs, the Free-Soil party, most of the Know-Nothing party, several Abolitionist groups and a number of Northern Democrats. It held its first national convention in Philadelphia in 1856 and nominated John C. Fremont for President. Fremont was defeated, but he had 113 electoral votes, against 174 for Buchanan. In 1860 the party came into power with the election of Abraham Lincoln, and, with the exception of the elections of 1884 and 1892, directed the policies of the nation until 1912. In that year a division in its ranks caused the organization of the Progressive party and enabled the

Democratic party to win the election. After eight years of Democratic rule, the Republicans were victorious in the elections of 1920 to 1928, inclusive, then gave way again to the opposition. For a detailed history of the Republican party and its relation to other political organizations, see **POLITICAL PARTIES IN THE UNITED STATES**.

The Anti-Federalist party took the name *Republican* when it came into power in 1801, at the election of Jefferson. Later it took the name Democratic-Republican, and this was finally changed to Democratic, a name it still retains. See **DEMOCRATIC PARTY**.

REPUDIATION, a refusal on the part of a government to pay the debts contracted by the governments which have preceded it. Repudiation has sometimes been resorted to by the smaller American republics and by states of the Union. It is frequently practiced by pretended or revolutionary governments which have no permanent existence. Sometimes cities, counties and towns have resorted to the practice.

REQUISITION. See **EXTRADITION**.

RESACA DE LA PALMA, *re sah'kah da lah pah'l'ma*, **BATTLE OF**, a short but severe engagement which occurred May 9, 1846, between a force of 5,000 Mexicans, under General Arista, and about 2,300 Americans, under General Zachary Taylor. The battle took place in Resaca de la Palma ravine, in Cameron County, Texas, four miles north of Brownsville. This was disputed territory, as Mexico insisted that the Nueces River, not the Rio Grande, was its northern boundary. After the battle the United States declared war on Mexico. See **MEXICAN WAR**.

RESERVOIR, *res'ur vvor*, an artificial basin for storing a large quantity of water. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earthwork, but the latter is the more usual, since it is generally the more economical method. Reservoirs in which the dams are built of earthwork must be provided with a waste-weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there be-

ing no fear of its endangering the works. Among the largest reservoirs connected with city water systems are the Croton and Ashoken reservoirs which supply New York City, and that of the Metropolitan Water Supply District of Boston. The largest reservoirs are those connected with irrigation projects. See **IRRIGATION**; **RECLAMATION SERVICE**; **WATERWORKS**.

RESINS, *res'ins*, a class of vegetable substances, insoluble in water, soluble in alcohol and easily softened or melted by heat. They are extensively used in the manufacture of varnish. Resins are transparent or translucent, and have generally a yellow-brown color. They become electrified when rubbed. Resins may be divided into three classes: (1) Those which exude spontaneously from plants or from incisions in the stems and branches. Represented by benzoin, dragon's blood, Peru balsam, storax, copaiba, copal, lac, myrrh and turpentine; (2) resins extracted from plants by alcohol or other solvents, among which are gum ammoniacum, angelica root, Indian hemp, cubebs, manna and squill; (3) fossil resins, occurring in coal or lignite beds, such as amber, asphalt, copaline and fossil caoutchouc. Some resins, when combined with essential oils, give out a fragrant odor. *Rosin* is the name given resins exuding from cone-bearing trees. See **ROSIN**; **TURPENTINE**.

RESOLUTIONS OF 1798. See **KENTUCKY AND VIRGINIA RESOLUTIONS**.

RESPIRATION. See **BREATHING**.

RESTIGOUCHE, *res ti goosh'*, **RIVER**, a stream in Canada famous for its trout and salmon. It flows in a general northeasterly direction about 200 miles, separating New Brunswick from the province of Quebec. The name, an Indian word meaning *dividing like the hand*, has reference to its five branches, each from fifty to seventy miles long. The river, navigable about eighteen miles, discharges into Chaleur Bay, an arm of the Gulf of Saint Lawrence. A tidal wave ascends the estuary twenty-four miles.

RESTORATION, *res tok rā'shun*, in history the return of a country to monarchical government. It is particularly applied to the reestablishment of the monarchy in England, succeeding the Commonwealth under Cromwell. Cromwell had beheaded the tyrannical Charles I. and had set up the Commonwealth in 1649, ruling it with a strong and able hand. After his death unsettled conditions led to the overthrow of the Commonwealth in 1659

and the coronation the next year of Charles II, whose reign was officially dated not from his actual accession but from the death of his father. See COMMONWEALTH OF ENGLAND; CROMWELL, OLIVER

RESUMPTION OF SPECIE PAYMENTS. See SPECIE PAYMENTS, RESUMPTION OF.

RESURRECTION, *rez ur rek'shun*, the rising of man after death, to be possessed of all his powers and faculties. The resurrection of the dead is mentioned a number of times in the Old Testament, but only the Israelites are there considered. The New Testament doctrine, founded upon the resurrection of Christ, who in *Revelation* is called "The first begotten of the dead" (*Revelation* I: 5), applies to all mankind. The beautiful story of the Resurrection as told in the Gospels cannot be improved. These accounts contain evidence of the fact of Christ's rising from the dead that objectors to belief in the Resurrection have never been able to set aside. The great argument in establishing the Resurrection as the chief cornerstone of the Christian faith is set forth by Paul in *I Corinthians*, XV, but his great question, "How are the dead raised? and with what manner of body do they come?" has never been answered. The Christian Church throughout the world considers the Resurrection of Christ to be the crowning evidence of the divine character of His mission.

RESURRECTION PLANT. See JERICHO ROSE.

RESZKE, *resh'ke*, the family name of two great singers. See DE RESZKE.

RETAINER, the formal engagement of an attorney by a client to prosecute or defend a suit at law, or to attend to such of the client's business as may require the services of an attorney. In the first instance the retainer is special; in the second it is general. The effect of the retainer is to confer on the attorney all the powers involved in the forms and usages of the court in which the suit is pending. The retainer is usually accompanied by a fee called the *retaining fee*, or *retainer*. The acceptance of this fee binds the attorney to his client, and prevents his acceptance of a retainer from the opposite party in the suit. A general retainer prevents the attorney from rendering any service that would be against the interests of his client.

RETRIEVER, *re tree'vur*, a dog specially trained to fetch game which has been shot; it is greatly valued by sportsmen for its intelligence in the field and in the water. The larger and more familiar breed of retrievers is a cross between the Newfoundland and the setter; the smaller breed is a cross between the water spaniel and the terrier. The typical retriever is twenty or more inches high, with a stoutly built body, strong limbs, webbed toes and black, curly hair. The American retriever, commonly known as the Chesapeake Bay dog, is the best known. He is very keen of scent and is an excellent swimmer.

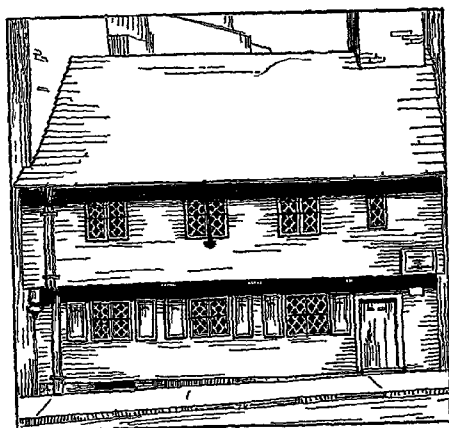
REUNION, *ra u nyohn'*, ILE DE LA, formerly ILE DE BOURBON, an island in the Indian Ocean, between Mauritius and Madagascar, belonging to France. It is of volcanic origin, and is mountainous. Piton de la Fournaise, an intermittently active volcano, is 8,713 feet high. The climate and soil are favorable to agriculture, and about one-third of the total area of 970 square miles is under cultivation. Coffee, sugar, vanilla, spices and cocoa are the chief crops. There is considerable commerce with France and other French colonial possessions. The population, which consists largely of negroes, Indian coolies and Chinese, is about 198,000, of whom 194,000 are of French European origin. The capital is Saint Denis.

REVAL, *ra vah'*, now TALLINN, a seaport on an inlet of the Gulf of Finland, capital of Esthonia, one of the so-called Baltic provinces of old Russia. Before the World War the city was third in importance among the Baltic ports, ranking next to Petrograd and Riga. It has two harbors, which rarely freeze, and in peace times enjoys a thriving export trade in flax, grain, pickled anchovy (a local product), animals and liquors. The old town, occupying low ground, is medieval in aspect, in the upper town are many handsome residences and public buildings. Reval was bombarded by German forces during the war, and after the surrender of Russia it fell a prey to Germany, as did all of Esthonia. Late in 1918 the Germans withdrew (see ESTHONIA). Population, 1932, 134,000.

REVELATION, Book of, the last book of the New Testament, called in the English Bible the *Revelation of Saint John the Divine*, also the *Apocalypse*, from a Greek word meaning to *uncover*. The author is unknown, but he is generally supposed to be the

Apostle John, who is alleged to have written the book while he was banished in the Isle of Patmos. *Revelation* is easily divided into three parts, known as the introduction, letters to the churches and the visions (of which there are nine).

No other book in the Bible has given rise to such frequent and spirited discussions,



PAUL REVERE'S HOUSE AT BOSTON

and many interpretations of it are in existence. One school of thinkers believes that it foretells the events that precede the end of the world. A second school believe the prophecies were uttered against the Roman Empire, and that the emperor of Rome was the Beast that was to be put down, because of his opposition to the spread of Christianity. A more recent opinion is that *Revelation* gathers the symbolism of the Old Testament and interprets it in the light of the Christian dispensation.

REVELSTOKE, B. C., in the Kootenay district, on the Columbia River. It is a divisional point on the Canadian Pacific Railway and has large repair shops, which are the largest industry at the present time. There are saw mills, a sash and door factory and a hospital. As the gateway to the Kootenay country, it is the headquarters for mine supplies and also for tourists and sportsmen. North of Revelstoke is the Big Bend mining region, which produces silver, lead, gold and copper. In the district is the Mount Revelstoke National Park. Population, 1931, 2,736.

REVENUE CUTTER SERVICE. See COAST GUARD.

REVERE, *re veer'*, PAUL (1735-1818), an American patriot, who rode from Boston to Lexington on the night of April 18, 1775, to give warning of the approach of a British expedition, which was resisted next day at Lexington and Concord. This deed inspired Longfellow's poem, *The Ride of Paul Revere*.

Revere was born in Boston. As an outcome of his education as an engraver he engraved and printed the first paper currency of Massachusetts. He was one of the leaders of the "Boston Tea Party" (which see), and in 1774 became an active member of the Boston League, organized to watch the British in that city. After his memorable ride to Lexington, Revere became lieutenant-colonel of state artillery and accompanied the unsuccessful Penobscot expedition in 1779.

REVOL'UTION, the name given a sudden movement, political or military, having for its end a change in government. Revolutions may be peaceful, but they are usually the cause or the outgrowth of war. The American Revolution was the cause of the war which followed, and the French Revolution of 1871, in which the empire was changed to a republic, was the result of the Franco-German war of that year. Revolution denotes the popular demand for a radical and immediate change, and it is opposed to reform which favors a gradual transformation.

A revolution is *external* when a part of the state separates itself from the original state and maintains its independence, as in case of the American colonies in 1776. It is *internal* when it results in a change in the form of government, as in the French Revolution in 1871, the revolution in Russia in 1917, and that in Germany in 1918. A revolution which has as its aim the overthrowing of all existing government is anarchism. A world revolution of the working classes was predicted by radicals at the close of the World War. The French Revolution of 1789 was one of the most important revolutionary movements in history because of its far-reaching effects. See FRENCH REVOLUTION.

Leaders of revolutions have a personal interest in the outcome of their endeavors, as well as a patriotic impulse to serve their fellowmen. A revolutionist who succeeds in his effort is hailed as a patriot; one who fails is likely to meet the fate of a traitor, if captured.



REVOLUTIONARY WAR IN AMERICA, the name commonly given to the struggle by which the thirteen English colonies in America achieved their independence and laid the foundations for the great republic that to-day is a world power second to none.

Causes of the War.

The causes which led to the war were directly due to an unfortunate policy of colonial administration on the part of the British government. It took the form of restrictions upon commerce; of taxation

for the purpose of supporting administrative policies in which the colonists had no voice, the establishment of a standing army in America, partly for the defense of the colonies and partly for the repression of the spirit of independence and democracy. These restrictions culminated in measures which were coercive and unconstitutional. (These measures are given in more detail in the article UNITED STATES, subhead *History*.)

Four Periods. From a military standpoint, the war may be divided into four periods, the first coinciding roughly with the period of political agitation, and including such events as the Boston Massacre, March 5, 1770; the destruction of the *Gaspee*, June, 1772, and the Boston Tea Party, December 17, 1773.

Second Period. The second period, which may be known as the era of independence, began with the assembling of the provincial congress in Massachusetts, October, 1774, its first military event being the battles of Lexington and Concord (April 18 and 19, 1775), and the beginning of the siege of Boston, on the latter date. On May 10 the colonial force, consisting of Green Mountain Boys under the command of Ethan Allen and regulars under Benedict Arnold captured Ticonderoga, and a little later, Crown Point. The Battle of Bunker Hill, on June 17, was won by the British at so heavy a cost that it amounted to an American victory, and was the first important engagement of the war.

In the fall of 1775, one of the most brilliant expeditions of the war was undertaken

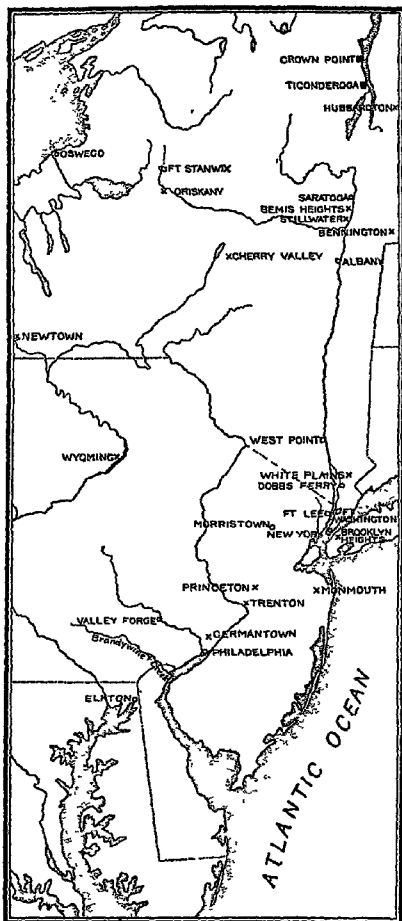
—an invasion of Canada. One force under General Robert Montgomery proceeded from Ticonderoga, captured Saint John's after a siege of fifty days and gained control of Montreal. Another force under Benedict Arnold started through the Maine woods to assist Montgomery in capturing Quebec. The final assault was upon the last day of the year, but it failed, Montgomery being killed, Arnold severely wounded, and the Americans were forced to retire to Crown Point. Boston fell into the hands of the Americans in March, 1776. The English withdrew, first to Halifax and then to the vicinity of New York City.

From this time three separate military movements on the part of the British were begun. These were the capture of Philadelphia, the capital of the United States; the isolation of New England, by the control of the Hudson Valley; and the invasion of the Southern colonies, which were supposed to be loyal to Great Britain. The third plan was attempted first, under the leadership of General Clinton, with the aid of a fleet, but it met with a disastrous termination, when an attack upon Charleston, S. C., was repulsed by an American force in Fort Moultrie (June 28). The second period of the war closed with the adoption of the Declaration of Independence, July 4, 1776.

Third Period. The third period, which may be known as the period of suspense, was ushered in by the Battle of Long Island, August 27, 1776, and the British capture of New York City, September 15. A few months later forts Washington and Lee fell into the hands of the British, and the Americans were compelled to retreat southward, hard pressed by General Howe, who aimed to take Philadelphia. This retreat upon the part of the Americans disclosed the remarkable military genius of General Washington. It culminated in two notable victories: one at Trenton, in which Washington completely surprised a troop of Hessians in the midst of Christmas night carousals and captured the whole force; the other at Princeton, January 3, 1777, by which he compelled the British practically to abandon the whole state of New Jersey. During this winter, Lafayette, Baron De Kalb, Kosciuszko and Pulaski arrived in America with a French force, which was to be of great service to the Americans in the pending campaigns.

In the succeeding fall the British began their campaign for the capture of the Hudson

River Valley. Burgoyne, with a force of 10,000 men, was to approach from Canada by way of Lake Champlain; Howe, with about an equal force, was to ascend the Hud-



THE WAR IN THE MIDDLE STATES
A cross indicates a battle, a square, a fort; a circle, an important town.

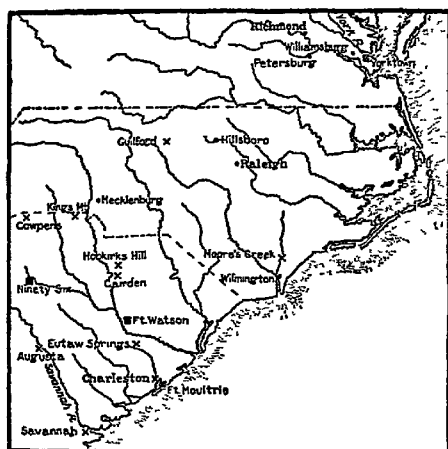
son River from New York; and Saint Leger, also with about 10,000, was to descend the Mohawk Valley.

Burgoyne's campaign began with a series of unimportant victories, including the capture of Ticonderoga and Crown Point, but he

lost a seventh of his force at the Battle of Bennington, August 17, 1777, and was finally compelled to surrender after two serious battles near Saratoga, September 19 and October 7, the formal capitulation taking place on October 17. Saint Leger encountered serious obstacles and was finally defeated at Oriskany, August 6, and compelled to retreat to Canada. Howe, meantime, had been lured from his purpose by the attractive program of capturing the rebel capital at Philadelphia and had abandoned the forces of Saint Leger and Burgoyne to their fate and begun his famous invasion of New Jersey. By defeating the Americans at Brandywine Creek (September 11), he was able to enter Philadelphia, leaving part of his force at Germantown. The Americans advanced to attack this division October 4, but failed, and retired to Valley Forge, where they spent the winter.

Fourth Period. In the following spring the last period of the war began. It included five separate campaigns. These were (1) the operations in New Jersey; (2) the siege of Newport; (3) the war on the frontier; (4) the Hudson Valley campaign, and (5) the second invasion of the South. The Americans received the news of the French alliance early in the spring, and were also strengthened by a fleet and land force sent by France. Philadelphia was evacuated by the British. June 18, 1778. This was followed by the disastrous Battle of Monmouth ten days later, the British retreating to New York City. The Hudson Valley campaign began with the storming of Stony Point, May 31, 1779, and again July 16, but this success was somewhat clouded by the treason of Benedict Arnold in the fall of the same year.

In the South the really crucial campaign of the war was fought out, its important engagements being at Brier Creek, March 5, 1779; the capture of Charleston by the British, May 12, 1780; the defeat of General Gates at Camden, August 10; and important American victories at King's Mountain, October 7, at the Cowpens, January 17, 1781, at Guilford Court House, March 15, and at Eutaw Springs, September 8. This campaign, though at first a failure, through blunders by General Gates, was brought to successful completion by General Nathaniel Greene, who finally drove the English army under Cornwallis into Virginia. Washington thereupon transferred a large part of his force



THE WAR IN THE SOUTH

A cross indicates a battle, a square, a fort; a circle, an important town

from the Hudson River Valley to the vicinity of Yorktown, a distance of 400 miles, and there, with the cooperation of the French fleet and the French army, compelled the surrender of Cornwallis, October 19, 1781. This virtually ended the war. The siege of Newport, in which the French and Americans were also allied, resulted in the complete defeat of the American plans, and the city remained in the hands of the British.

On the frontier, the war which had begun with the fearful massacre in the Wyoming Valley was completed by the Battle of New Town, between a force under General Sullivan and a company of British and Indians, the former being successful. Meantime, George Rogers Clark had taken Vincennes and established the authority of the colonies in the Northwest Territory. The only important naval battle of the war was that between the *Bon Homme Richard*, the flagship of John Paul Jones, and the *Serapis*, on September 3, 1779. It was a brilliant victory for the Americans and one of the most important sea battles in modern history.

Treaty of Peace. The British king and Ministry reluctantly agreed to make peace, the treaty being signed at Paris, September 3, 1783. This treaty recognized the independence of the United States and established the boundaries of the new nation at the Mississippi River on the west, the Great Lakes and Saint Lawrence River on the northwest, an arbitrary boundary at about 45° north

latitude on the north and the northern boundary of Florida on the south. It also made provision for the evacuation of western posts by the British, for the payment of war claims to the Tories and for the settlement of other minor questions. John Adams, Benjamin Franklin, and John Jay were American representatives of the peace commission.

Related Articles. Consult the following titles for additional information:

HISTORICAL ARTICLES

Bennington, Battle of	Hessians
Bon Homme Richard	Lexington, Battle of
Boston Massacre	Monmouth, Battle of
Boston Port Bill	Navigation Acts
Boston Tea Party	Paris, Treaties of
Brandywine, Battle of	Princeton, Battle of
Bunker Hill, Battle of	Saratoga, Battles of
Committees of	Stamp Act
Correspondence	Ticonderoga, Battles of
Conway Cabal	Trenton, Battle of
Declaration of Independence	Valley Forge
Flag	White Plains, N. Y.
Germantown, Battle of	Wyoming Valley
Green Mountain Boys	Massacre
Guilford, Battle of	Yorktown, Sieges of

BIOGRAPHIES

Adams, Samuel	Henry, Patrick
Allen, Ethan	Howe, William, Sir
Andre, John	Jones, John Paul
Arnold, Benedict	Lafayette, Marquis de
Burgoyne, John	Lee, Charles
Carleton, Guy, Sir	Lee, Henry
Clark, George Rogers	Lee, Richard Henry
Clinton, George	Marion, Francis
Clinton, Sir Henry	Otis, James
Cornwallis, Charles	Putnam, Israel
De Kalb, Johann, Baron	Revere, Paul
Franklin, Benjamin	Ross, Betsy
Gage, Thomas	Stark, John
Gates, Horatio	Seuben, Baron von
Greene, Nathanael	Warren, Joseph
Hale, Nathan	Washington, George
Hancock, John	Wayne, Anthony

REVOLVER, a firearm in which a number of charges, contained in a revolving cylinder, are, by pulling the trigger, brought successively into position and fired through a single barrel. For the revolver in traditional form we are indebted to Colonel Samuel Colt, though repeating pistols had long been known when he invented the revolver. In Colt's weapon there is a revolving cylinder containing six chambers, placed at the base of the barrel. The cylinders contain the cartridges, which are put in from the front of the breech-piece. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, until each chamber in succession is brought round so as to form virtually a continuation of the barrel.

Many improvements have been made since the original invention by Colt. Some of these had in view increasing the rapidity of firing; others have diminished the risks to which inexperienced persons must ever be exposed in handling these weapons. The

highest degree of perfection in the revolver has been reached in the automatic pistol, which is hammerless, and fires its cartridges with great rapidity, requiring only a continuous pressure upon the trigger. This weapon, not a revolver, has largely replaced the latter, it is very modern and very deadly.

In most civilized countries carrying a revolver except by policemen and other officials when on duty is a criminal offense. Such regulations have become necessary to the protection of society because of the many fatal accidents that have occurred from the handling of these weapons by inexperienced people, and also because the man who desires to carry a revolver is not supposed to be a peaceful citizen. A man on proper showing may be given legal permission to carry a deadly weapon; otherwise, possession of one carries the implication that other than peaceful pursuits is the intent of the owner.

REXFORD, EBEN EUGENE (1848-1916), an American poet and writer on gardening and kindred subjects. As a lad he moved with his family from Johnsbury, N. Y., his birthplace, to Wisconsin, and he was educated at Lawrence University, Appleton. When only fourteen he began contributing articles to periodicals, and in course of time came to be recognized as an authority on horticulture. He took part in many philanthropic activities and served for twenty-five years as organist of the Congregational Church of Shiocton, Wis. His best-known poem is the ballad *Silver Threads Among the Gold*, which has been set to music. Other poems are contained in the volumes *Brother and Lover* and *Pansies and Rosemary*. Of his numerous volumes on gardening, those which have been most widely used are *Home Floriculture; Flowers—How to Grow Them; Four Seasons in a Garden; The Home Garden; The Indoor Garden, and Amateur Garden Craft*.

REYKJAVIK, *ra kyah veek'*, ICELAND, the capital of the island, situated on the southwest coast. It is the cultural center of the island, has a complete school system, including a university, daily newspapers, and all modern city conveniences. It is linked to Europe and America by mail steamers and radio. There is considerable trade with the United States. Population, 1933, 31,689, mostly native Icelanders.

REYNOLDS, JOSHUA, Sir, (1723-1792), an English portrait painter born at Plympton,

Devonshire. Through the kindness of Captain (afterward Admiral) Keppel, he was enabled to visit Italy, where he studied three years. Returning to London in 1753, and finding generous patrons in Admiral Keppel and Lord Edgecombe, his studio was thronged with people of wealth and fashion; the most famous men and women of the time were among his sitters. Many of his best canvases, including portraits of Goldsmith, Dr. Johnson, Garrick and Admiral Keppel, are in the National Gallery, London. Among the most notable of his portraits are *Duchess of Hamilton, Duke of Cumberland, Mrs. Siddons as The Tragic Muse* and *Duchess of Devonshire*.

In 1768, on the foundation of the Royal Academy, he was chosen president, soon afterward was knighted and in 1784 was appointed principal portrait painter to the king. As president of the Royal Academy he delivered his celebrated annual *Discourses on Painting*, the last of which was delivered in 1790. Reynolds was the intimate friend of Dr. Johnson, Goldsmith, Garrick, Burke and other literary celebrities, with whom he was associated in founding the "Literary Club" in 1764. Reynolds died unmarried and was buried in Saint Paul's Cathedral.

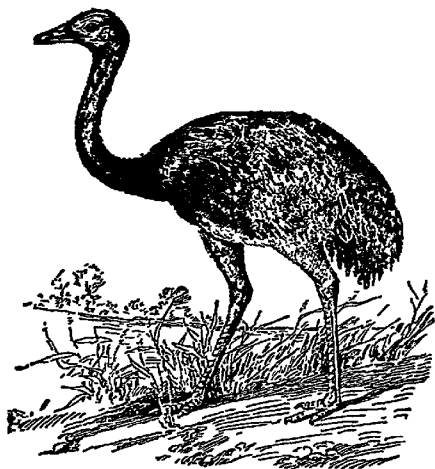
There are many of his works in the United States. In the Metropolitan Museum and the Public Library, New York, there are several fine examples, besides numerous canvases in private collections. His portraits are distinguished by dignity and grace, and above all by a harmony of color which he learned from the great Italian masters. His portraits are of much historic interest apart from their value as art, for they are said to be excellent likenesses of the originals.

REHADAMANTHUS, *rad-a-man'thus*, in Greek mythology, a son of Jupiter and Europa, and brother of Minos, king of Crete, whom he assisted in ruling his kingdom. He aroused the jealousy of Minos by his inflexible integrity, which earned for him the admiration of the Cretans, and was forced to flee the country. After his death he became, on account of his sense of justice, one of the three judges of the lower world.

RHEA, *re'ah*, or **MAN'DU**, a large bird popularly called the "South American ostrich," although it differs from the ostrich in so many points that naturalists are now placing it in a separate family. For instance, the rhea has three toes with claws, the

ostrich has two without claws; the rhea's head and neck have feathers, while the ostrich's are bare; the rhea is about half the size of the ostrich, and its wings are so small that they are of no use in flight.

The rhea is found on the plains of Southern Brazil, in Uruguay, Paraguay and North-



RHEA

ern Argentina. The birds live in communities, and there are two or more females to each male. The females of each group lay their eggs in the same nest, and when twenty or twenty-five eggs have been deposited, the male sits upon them until they are hatched. After the hatching he feeds and cares for the young until they are able to care for themselves.

RHEA, in Greek mythology, the daughter of Uranus and Ge (Heaven and Earth), sister and wife of Saturn and mother of Jupiter, Neptune, Pluto, Vesta, Ceres and Juno. She was the symbol of the reproductive power of nature, and to her was often given the name, "Mother of the Gods," or "Great Mother."

RHEIMS, or **REIMS**, *reems*, FRANCE, a noted city in the northern part of the republic formerly a flourishing town of over 120,000 inhabitants and the seat of one of the finest Gothic cathedrals in the world. Rheims is about 100 miles northeast of Paris, on the Vesle River. From the beginning of the World War, in 1914, until near its close, the city was under bombardment, and when the armistice came it was largely in ruins. Rising above the desolation about it was the partly-ruined, beautiful thirteenth-century

Cathedral of Saint Louis, a tragic memorial of the destructiveness of modern war. Its lofty towers, wonderful façade and rose window had been the joy of art tourists from all over the world, while the cathedral itself was beloved by the French people both for its religious and for its historic associations. Here were crowned the kings of France for over six centuries, and here Joan of Arc witnessed the coronation of Charles VII, in 1429. Rheims occupied the site of an old Roman town, and was an important city of the Frankish kings. It developed into one of the most picturesque cities in France, and was important industrially as a wine center and for its woolen manufactures. The Cathedral and other buildings in the city have been largely restored. Population, 1931, 112,820.

RHETORIC, in its widest sense, the theory of verbal communication, whether spoken or written. It treats of the general rules of prose style, in view of the end to be served by the composition. In a narrower sense, rhetoric is the art of persuasive speaking, or the art of the orator, and treats of the composition and delivery of discourses intended to move the feelings or sway the will of others. In its wider sense, rhetoric treats of prose composition in general, purity of style, structure of sentences, figures of speech—in short, of whatever relates to clearness, precision, elegance and strength of expression. It is broader than grammar, which deals primarily with correctness in sentence structure, and it is studied later in school life, sometimes in the first year of high school.

RHEUMATISM. Under this comprehensive term are included a variety of physical troubles, widely different in origin. All of them, however, are characterized by exceedingly painful inflammation of joints or muscles. *Inflammatory rheumatism*, or *rheumatic fever*, is a form in which the joints are affected. It is now regarded as an infectious disease. Some authorities believe that a specific germ is the cause, but the majority hold that it results from toxins produced by diseased tonsils or other infection. This disease attacks both children and adults, but the symptoms vary considerably with the age of the patient. Severe pain and high fever characterize most cases occurring in adults, but the disease is seldom fatal unless the heart becomes involved. Heart complications are much more common with children than

with adults, and chronic heart trouble often results.

Chronic rheumatism is the general name for a large number of painful ills centering in the muscles and joints. Most of them are brought on primarily by exposure to dampness and cold, and all varieties of chronic rheumatism are consequently much less frequent in warm, dry climates. Persons with a tendency to rheumatism in any form should eat nourishing food, avoid unnecessary exposure and take excellent care of the general health.

Lumbago is a form of muscular rheumatism. The name rheumatism is often applied to affections which are in reality neuralgic in their nature.

RHINE, *rine* (in German, *Rhein*), the great historic river of Germany, one of the most beautiful and most important rivers of Western Europe. To the German people it has always seemed to symbolize the glory of their Fatherland. The provisions concerning the Rhine, in the peace treaty imposed by the allies at the close of the World War, typified unmistakably the measure of Germany's defeat. The great river was internationalized on the whole of its navigable course, and all fortifications on the east bank, to a depth of thirty miles, were ordered demolished. As a guarantee for the execution of the treaty, German territory to the west of the river was set apart to be occupied by allied troops for fifteen years. That is, the Rhine, instead of being a bulwark of German imperialism, as had been the proud boast of Teutons for fifty years, became a protective barrier for France.

Course of the River. The Rhine is formed in the Swiss canton of Grisons by two main streams, called the Vorderrhein and the Hinterrhein. The Vorderrhein rises on the slope of the Saint Gotthard Mountain, at a height of 7,690 feet above the sea, near the source of the Rhone, and at Reichenau unites with the Hinterrhein, which issues from the Rheinwald glacier. Beyond Reichenau the united streams take the name so well known. The Rhine flows northward through Lake Constance to the town of that name, between which and Basel it flows westward, forming the boundary between Switzerland and Austria. At Basel it turns once more to the north and enters Germany; and, generally speaking, it pursues a northerly course until it enters Holland, below Emmerich, when it divides

into a number of separate branches, forming a great delta and falling into the sea by many mouths.

In the German part of its course the chief tributaries it receives on the west are the Ill, the Moselle, the Aar and the Erft; and on the east, the Neckar, the Main, the Ruhr and the Lippe. In Switzerland its tributaries are short and unimportant, and this section of its course is marked by the falls of the Rhine at Schaffhausen. The chief towns on its banks are Constance and Basel in Switzerland; Speyer, Mannheim, Mainz, Coblenz, Bonn, Cologne and Dusseldorf, in Germany; Arnheim, Utrecht and Leyden, in Holland. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries has been seriously interfered with by the introduction of steam vessels. The Rhine is about 700 miles in length and is navigable without interruption to Basel, a distance of 550 miles. Much timber, coal, iron and agricultural produce are conveyed by it. Large sums have been spent every year in keeping the channel in order and in the erection or repair of river harbors, both in Germany and in Holland.

Scenic Beauties. The Rhine is distinguished for the beauty of its scenery, which attracts many tourists. Throughout a large part of its course it has hills on both sides. Pleasant towns and villages lie at the foot. Above them rise rocky steep slopes clothed with vines or with forests; and the castles, bridges, and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part of the Rhine, from the scenic standpoint, is between Bingen and Bonn; after the Rhine enters Holland, the scenery is generally uninteresting.

The Rhine in History and Literature. The deep significance of the Rhine to the Germans is evident in their national anthem, *The Watch on the Rhine*. Lord Byron and other poets have immortalized it in their poems, and Wagner has embodied many of the legends of the Rhine in his *Nibelungen* operas. The Rhine has figured in German history since the days of Caesar. In the Middle Ages, from Basel to the Netherlands, it was under German rule. Napoleon restored the old Roman boundaries of France. After his fall, Alsace-Lorraine, which is bordered on the east by the river, continued a possession of the French until it was wrested from them by the Ger-

mans in the Franco-German war of 1870. The defeat of Germany in 1918 placed a part of the Rhine territory under allied control, but Germany reoccupied it in 1936, ignoring treaty obligations.

RHINOCEROS, *ri nos' e ros*, a large ungainly animal, characterized by a thick, heavy body, short legs, feet with three toes, each enclosed in a single hoof, and a large head having one or two horns rising from the snout. There are five species, found only in Southern Asia, the islands of the Indian Archipelago and Southern Africa. The Indian rhinoceros is the largest and is the best known in Europe and America, where the animals are frequently found in zoological gardens and menageries.

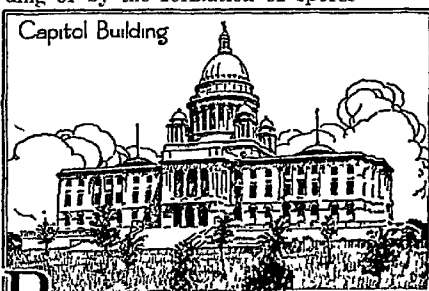
The largest animals are about six feet high and weigh from 4,000 to 6,000 pounds. The horn is from one to two feet long, and is slightly curved backward. The color is a dark brownish-gray, and the skin hangs loosely on the body, in the Indian species being arranged in folds. When two horns are present, the shorter one grows behind the other. The rhinoceros lives in marshy places, and feeds upon grass, weeds and leaves of trees and shrubs. It often uses its horn to dig up and overturn small trees that it may eat the foliage. Though possessed of great strength, the rhinoceros is inoffensive unless attacked.

The Sumatran species is hairy and smaller than the Indian, and has two horns. The African species has no folds in the skin. It has two horns, and is of a ferocious disposition. Notwithstanding its short legs and heavy body, it can run for a short distance as fast as a horse.

Although the rhinoceros is exceeded in size in the animal world only by the elephant and the hippopotamus, it is difficult to hunt. By day it is well hidden in a jungle, where the rank growth of grasses and reeds reach a height of ten to twenty feet; it ventures forth to feed principally at night. Hunters use elephants to track it; rarely do they use one elephant, but prefer to employ a number of these beasts to beat about the jungle and drive the prey into the open; here hunters are stationed at intervals with high-powered guns ready, loaded with sharp steel bullets. The rhinoceros is a dangerous adversary only when brought to bay, in which situation hunters must exercise great caution.

Rhinoceros Bird. Man and insects are the only enemies of the rhinoceros. Insects torment the huge animal by getting under the folds of its skin. It finds some relief by wallowing in the mud during the day. Among its friends is the so-called rhinoceros bird, a little creature about as large as a thrush. The bird perches upon the animal's back and head, and eats large numbers of the insects that annoy it. The birds are also supposed to warn the animal of approaching danger, because they are frequently seen running over its head or flying about it, uttering shrill warning cries, which the animal seems to understand.

RHIZOPODA, *riz op'o da*, the lowest class of protozoa, comprising a large number of microscopic forms, all of which possess protoplasmic projections of the body known as pseudopodia (false feet). These projections may be used for locomotion or for taking food into the stomach. Most of the species are spherical, with radiating pseudopodia, but the lowest forms, as the amoeba, have no constant shape. The only internal organs are minute cavities having digestive and excretory functions. Reproduction is by budding or by the formation of spores.



RHODE ISLAND, the smallest state in the Union, and the last of the original thirteen to ratify the Federal Constitution. Its popular name, **LITTLE RHODY**, needs no explanation, but the origin of its official name is not so clear. It has been suggested that it was given because of a supposed resemblance between the Isle of Rhodes, near Asia Minor, and the island in Narragansett Bay on which the city of Newport is located. The state is one of the southern tier of the New England group, and is bounded by Massachusetts on the north and east. The Atlantic Ocean forms its southern boundary,

and Connecticut adjoins it on the west. With an area of 1,248 square miles, Rhode Island could be contained in Texas about 205 times, and it could include within its own boundaries only three cities the size of New York. Its extreme length from north to south is slightly less than 50 miles; its width is 37 miles. Of the total area, 181 square miles are water surface.

People and Cities. Eleven states have a smaller number of inhabitants than Rhode Island, but it is the most densely populated of all the states. In the census of 1930 the population was 687,497, with a density of 644.3 to the square mile. Of this number 96 per cent live in towns or cities. Among the foreign born, who constitute one-fifth of the total population, the most important numerically are the English, Scotch, Irish, English Canadian, French Canadian and the Italian.

Providence, with a population of 252,981 in 1930, is the largest city and the capital. It is also the second largest municipality in New England, ranking next to Boston. The next six cities in Rhode Island in order of size are Pawtucket, Woonsocket, Cranston, East Providence, Newport and Central Falls, each of which contains over 25,000 population. There are 14 cities in the state with more than 10,000 inhabitants.

Surface and Drainage. There are no mountains in the state, but the surface is considerably diversified. The northern and western sections are hilly, and the land slopes toward Narragansett Bay and the Atlantic Ocean. The Atlantic coast line measures about 45 miles, but Narragansett Bay, which penetrates inland about 30 miles, affords with its various inlets about 350 miles of shore washed by tidewater. The southern coast west of Point Judith is low and sandy. To the east the shores are formed by high, rocky cliffs, interspersed with beaches of sand. Rhode Island is drained chiefly by the Pawtuxet, the Blackstone or Seekonk, and the Pawcatuck rivers. They all afford excellent water power and the last two are navigable for short distances by small vessels. Providence River, on which the city of Providence is situated, is really a tidal arm of Narragansett Bay. This Bay contains numerous islands, the largest being Rhode, Conanicut and Prudence.

Climate. The climate is nearly like that of adjoining states, though somewhat mod-

erated by Narragansett Bay; the summer season is delightful, particularly at Newport where the mean temperature is 46°. The annual rainfall is 40 inches in the east and 44 inches in the west.

Mineral Resources. Rhode Island is not an important mineral state, but granite of good quality is quarried in various sections. Under Narragansett Bay and to the east there is a coal-bearing formation, the deposits of which are worked on a small scale. Other mineral products of economic value are iron ore, limestone, graphite and clay. The value of the annual mineral output is worth about \$500,000.

Agriculture. The district of the state known as "Island of Rhode Island" and the northwestern section are especially fertile. There are excellent markets within easy access of nearly every farm in the state by means of the railroads and the excellent highways. Market gardening is successfully carried on; corn, rye, oats and hay are produced in large quantities in yields that compare favorably with those of the other New England states. Fruit is an important product. Poultry culture has been developed extensively; the state is widely known for its "Rhode Island Reds" and for other breeds of poultry.

Manufactures. Manufacturing is by far the leading industry. Textile industries of many kinds are the most important, with an annual output valued at more than \$400,000,000. Rhode Island ranks high in cotton goods, woolen and worsted, silk and silk products and hosiery and knitgoods. In the manufacture of jewelry and silverware it is surpassed only by New York; this industry is centered at Providence. Other industries include the manufacture of files, rubber and elastic goods, and electrical supplies. Bristol is famous for its yacht-building. Although thirty-seventh in population, the state ranks seventeenth among the states in the value of manufactures.

Transportation. There are ample railroad facilities. The New York, New Haven & Hartford has 200 miles of track in the state. Bus lines connect with all the centers of population within and without the state. The highways are highly developed, being very generally paved. Steamship lines connect Providence and Newport with New York and Philadelphia. The state airport is situated just outside of Providence.

RHODE ISLAND

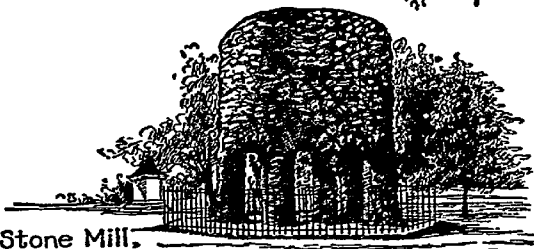
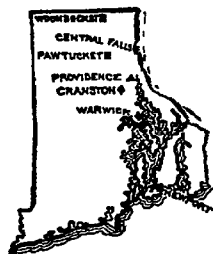
LITTLE RHODY



State Seal



Part of Campus at Brown University

Violet,
State FlowerOld Stone Mill,
Newport

Government. The legislature consists of a senate and a house of representatives. The senate is made up of 38 members, one from each city or town, the house of representatives contains one or more members from each town or city, according to population, except that no town can have more than one-fourth of the 100 members to which number the house is restricted. The legislature meets annually, and the members may receive compensation for 60 days. The executive department consists of a governor, a lieutenant-governor, a secretary of state, an attorney-general, an auditor, a treasurer, an adjutant-general, a commissioner of public schools and a commissioner of insurance. The courts consist of a supreme court, the judges of which are elected by the general assembly, and such inferior courts as the legislature may establish. Progressive legislation has set up juvenile courts, workmen's compen-

sation machinery and has dealt with banking, relief, working conditions in factories, milk distribution and forestry.

Education. The public school system has been highly developed; high schools are maintained in all of the municipalities. Higher education is provided at the State College at Kingston; and at the Providence College, the College of Pharmacy and Allied Sciences, the State College of Education, and Brown University—all located in Providence.

History. Rhode Island was founded in 1636 by Roger Williams, an exile from Massachusetts Bay. Portsmouth, Newport and Warwick were settled soon after, and in 1644 all the settlements were united under an extremely liberal charter. From the beginning, Rhode Island maintained religious liberty. A new charter was granted in 1663, and under it Rhode Island was governed for nearly 180

Items of Interest on Rhode Island

Providence produces a very large proportion of the jewelry manufactured in the United States, the refining of gold and silver from the sweepings of these great factories has in itself become a great industry.

The official name of the state is RHODE ISLAND AND PROVIDENCE PLANTATIONS.

Rhode Island's flower emblem is the violet.

The first Baptist church in America was founded at Providence.

The highest point in the state, Durfee Hill, has an elevation of 805 feet.

Great Salt Pond, a good harbor on Block Island, ten miles off the mainland, has been improved by means of funds voted by Congress. Newport, Bristol and Warren are centers of customs districts.

At Pawtucket was established the first cotton-spinning plant erected in America.

The Rhode Island flag is white, with a golden anchor surrounded by thirteen gold stars. The motto, "Hope," is in blue beneath the anchor.

Rhode Island was the first state east of Ohio to grant women Presidential suffrage.

Questions on Rhode Island

How does the density of population of Rhode Island compare with that of other states?

How many states exceed it in size? In population?

What rank among the cities of the United States does Providence hold?

Why has the state so large a proportion of Roman Catholic communicants?

What famous seaside resort is located on an island in Narragansett Bay?

What is the highest point in the state?

How do the manufacturing and agricultural industries compare? Is there any relation between this comparison and the percentage of urban dwellers?

By whom and for what reason was the first Rhode Island settlement made?

years. The colony was from the beginning the seat of all sorts of religious and political controversies; it took advanced ground in favor of the Revolution, but was the last state to ratify the Federal Constitution (May 29, 1790). During the nineteenth century the state enjoyed continuous prosperity and became an important manufacturing center. Its progress was disturbed for a short time in 1842 by Dorr's Rebellion. This incident grew out of the failure to gain by constitutional means an extension of the suffrage, a readjustment of representation in the legislature and a reform of the judicial system. However a revised constitution was adopted in 1842; it extended the franchise to some degree. A constitutional amendment adopted in 1888 gave to naturalized citizens the right to vote. Another amendment adopted in 1909 reduced to some extent the injustices of the representative system.

There has evidently been a deep-seated fear in the citizens of the state that hard-won liberties might be taken from the people. Individualism seems to have had its strongest defense in Rhode Island. Even yet the cities do not have representation in the legislature in proportion to their population. The city of Providence contains about one-third of the population of the state, but has been sending only one senator out of 39 to the legislature; only one-fourth of representatives reside in Providence.

Related Articles. Consult the following titles for additional information

Brown University
Central Falls
Cranston
Dorr's Rebellion
Hutchinson, Anne
Narragansett Bay

Newport
Pawtucket
Providence
Warwick
Williams, Roger
Woonsocket

RHODES, *rohds*, an island in the Mediterranean Sea, off the southwest coast of Asia Minor, from which it is separated by a channel about twelve miles broad. It is forty-nine miles long, and the greatest breadth is twenty-one miles. The island is mountainous, the climate healthful and the soil favorable to agriculture. The valleys produce oranges, citrus and other subtropical fruits. The population in 1933 was 56,322.

In ancient times Rhodes was an important Greek state, known widely for its learned men and for the celebrated colossal statue of its chief harbor (see SEVEN WONDERS). It was from 1309 to 1522 the stronghold of the

Knights of Saint John, from whom it was wrested in the latter year by the Turks. It now belongs to Italy. The capital is Kastro.

RHODES, CECIL JOHN (1853-1902) a South African statesman, known as the Empire Builder, was born at Bishop Stortford, England. After attending grammar school, he was sent in 1870 to Natal, South Africa, for his health. The next year he went to Kimberley, where he became interested in the diamond mines, and within two years amassed a fortune. Having recovered his health

he returned to England and entered Oriel College, Oxford, in 1876, and was graduated in 1881, spending only half of each year at the college. In 1880 Rhodes entered the Cape Parliament, and began his efforts to extend British imperial authority in South Africa, a purpose to which he devoted the remainder of his life.

In 1884, through his efforts, Bechuanaland was annexed to the British possessions, and four years later he secured from the Matabele the territory now forming Rhodesia. The British South African Company was placed in charge of this territory. Rhodes was head of the company and devoted much of his private fortune to developing the territory.

In 1890 Rhodes became premier of Cape Colony, and while in this position he projected the Cape-to-Cairo Railway. His aggressive measures in the interest of the empire brought him into conflict with the Boers, or Dutch settlers of the Transvaal, which led to the South African War. After the Jameson Raid in 1895, Rhodes resigned as premier and went to Rhodesia. He was at Kimberley during the war and aided in the defense of the city. He died before the treaty of peace was signed.

During his life Rhodes was the most prominent figure in British South Africa, and the movements which he fostered laid the foundation for the Union of South Africa, formed in 1909. The most remarkable feature of his will was the provision for maintaining a number of students from each of the British colonies, the United States and Germany at

Oxford University. See CAPE-TO-CAIRO RAILWAY; RHODES SCHOLARSHIPS.

RHODESIA, *ro dé'z'ä*, a British protectorate in South Africa, extending from the Transvaal province on the south to the Belgian Congo and the present Tanganyika Territory on the north. It is bounded on the east by the Tanganyika Territory, Nyasaland and Portuguese East Africa, and on the west by Portuguese West Africa, or Angola, and Bechuanaland. The entire protectorate has an area of about 440,000 square miles, making it about four times the size of Colorado. The Zambezi River divides Rhodesia into two parts, that part north of the river being known as Northern Rhodesia and that south of it as Southern Rhodesia.

Northern Rhodesia. Northern Rhodesia has an area of 291,000 square miles, and a population of 10,530 Europeans and 1,382,700 natives; most of the latter are Bantus. The territory is divided into ten administrative districts. The administrative headquarters are at Livingstone; the other important towns are Fort Jameson, Fife, Abercorn, Fort Rosebery and Broken Hill.

The country is almost wholly an elevated plateau, much of which is covered with light forests. The soil is good, and the climate is salubrious. Extensive tracts are well suited for agriculture and grazing. The chief agricultural products are corn, cotton, tobacco, wheat, coffee, cattle, and hides. Large quantities of rubber are also produced, and the rubber trees are carefully protected. There is plenty of timber for all local needs. The chief minerals are gold, copper, zinc and lead. Coal measures have been discovered.

Southern Rhodesia. Southern Rhodesia has an area of 150,344 square miles and a population of about 53,000 Europeans, 1,155,000 natives and about 4,550 Asiatics. The chief towns and Salisbury, the capital of Southern Rhodesia, Bulawayo, Victoria, Umtali and Gwelo. For the purpose of administration it is divided into two districts—Mashonaland and Matabeleland. Both soil and climate are well suited to agriculture and grazing, and raising of live stock is an important industry. The Europeans have more than 260,000 acres and the natives 21,000,000 acres under cultivation. The chief crops are corn and other cereals, vegetables, fruits, Kafir corn, tobacco and cotton.

The territory is rich in minerals, and in 1933, about \$20,000,000 worth of gold was



CECIL RHODES

mined. Diamonds are mined to some extent, and valuable deposits of coal, copper, silver, iron, antimony and lead have been discovered.

Administration. Rhodesia is under the administration of the British South Africa Company, and the administrative system is prescribed by British Orders in Council in London. The administrator appointed by the company must be approved by the Secretary of State for the Colonies, and he is assisted by an executive council of not fewer than three members, appointed by the company and approved by the Secretary of State. There is also a legislative council. There are commissioners for each territory and for the various districts. The natives are given a share in the government, and there a number of native commissioners. Land has been set apart for native settlements, the mineral rights being reserved to the company; before the close of the World War the company made a free grant of 5,000,000 acres for settlement by soldiers who were in the service. Rhodesia was named for Cecil Rhodes, the "Empire Builder" of Africa. See RHODES, CECIL J.

Transportation and Commerce. The main line of the Cape-to-Cairo Railway (which see) extends through the protectorate from north to south, and a branch extends to Salisbury and into Portuguese East Africa. The entire mileage of the system in Rhodesia exceeds 2,400. The Zambezi and a number of other rivers are navigable. The chief towns are connected by telegraph, and a good postal system reaches all settlements.

RHODES SCHOLARSHIPS, a number of scholarships established by the will of Cecil Rhodes, for the purpose of maintaining a certain number of British, American and German students at Oxford University, in the belief that "a good understanding between England, Germany and the United States will secure the peace of the world and that educational relations form the strongest tie." Since the war Germans are excluded.

They are apportioned as follows: Rhodesia, 9; Union of South Africa, 12, Australia, 6; New Zealand, 1; Jamaica, 1; Canada, 10; Newfoundland, 1; Bermuda, 1; Malta, 1 every third year; United States, 32 each year. Candidates from the United States must be nineteen to twenty-five years of age, unmarried, and citizens of the state in which application is made. The method of selection is in the hands of a committee in each

state, and the chairmen of these committees are presidents of state or other prominent universities. Except in Massachusetts, where candidates from secondary schools are admitted, candidates must have attended a college for at least two years. Candidates from the United States who are otherwise eligible are not required to pass a qualifying examination, but are selected on the basis of their university or college standing, subject to any further test which the committee may impose.

An American secretary to the Cecil Rhodes Trust has been appointed, who may be consulted on questions pertaining to the Rhodes Scholarships in the United States. Students may enter the graduate or the undergraduate departments of the university, and may strive for degrees and compete for honors. See RHODES, CECIL JOHN.

RHODODENDRON, a genus of trees and shrubs belonging to the heath family. There are about 170 species, found in the mountains of North America, Europe and Asia; all are noted for their beautiful flowers and dark evergreen leaves. One of the best known is the *wild laurel*, or the *great rhododendron*, found in the Allegheny Mountains, where it may form almost impassable thickets by the interlacing of branches. It is a shrub or small tree that may grow to a height of thirty-five feet. It bears large white or rose-colored bell-shaped flowers, and glossy evergreen leaves.

The *catawba rhododendron* is the one commonly seen in gardens, where it is a great favorite because of its beautiful lilac-colored flowers. It grows profusely on the mountains of Virginia, and is shipped north for transplanting. Other species of equal beauty are found on the Pacific coast. The tree rhododendron of the Himalayas has silvery leaves. The rhododendron is the state flower of the states of Washington and West Virginia.

RHOMBUS, *rombus*, a plane figure bounded by four equal straight lines, the opposite sides being parallel and the opposite angles being two equal acute and two equal obtuse angles. See POLYGON.

RHONE, *rohn*, the principal river of France. It rises in the Rhone Glacier in Switzerland, 7,550 feet above sea level, flows southward and discharges into the Gulf of Lyons. With its tributaries—the Isère, the Durance and the Saone—it drains the south-

eastern portion of the country and brings to the sea a greater volume of water than any other river of France. The valley, lying between the plateau and the Alps, is one of remarkable beauty, and the delta formed at the mouth of the river is one of the largest in the world. The Rhone is about 500 miles long, and is navigable for 320 miles. By a magnificent system of canals navigation has been extended to the Rhine, the Seine, the Loire, the Meuse and the Belgian system of canals. The Rhone is one of the chief waterways of Europe, and, possibly with the exception of the Danube, the most important European waterway in the traffic with Asia.

RHUBARB, *rho'barb*, often called *pie-plant*, is a garden plant whose leafstalks are used as filling for pies and for sauce. A kind of wine is sometimes made from the juice. The plant has large fleshy roots, large leaves and stems six to eight feet high. The rhubarb used in medicine is prepared from the root of another species. The rhubarb plant is a native of Central Asia, but it has been transplanted into practically all the countries of the temperate regions.

RIB'BON, any narrow woven fabric, usually of silk, satin or velvet. The manufacture of ribbon forms a special branch of the textile industry and requires looms specially constructed for the purpose. Ribbons are of all widths, from one-fourth inch up to nine inches. Much ingenuity has been displayed in constructing looms on which ribbon of intricate patterns—sometimes including landscapes and portraits—are woven. On some modern looms forty ribbons may be woven at once. Ribbon is used for decorating women's and children's dresses, for tying packages and for numerous other purposes. Saint Etienne, France, is the great center of the ribbon industry. In the United States its manufacture is almost entirely confined to the East; Pennsylvania and New Jersey produce three-fourths of the output.

RIBBON FISH, the name of certain deep-sea fishes found in all salt waters. The body is like a band, from fifteen to twenty feet long, about one foot broad and an inch or two thick, and is silvery in color. The bodies of these fish, like those of all other deep-sea animals, are stored with air to resist the heavy pressure of the sea's weight, and when they happen to be brought to the surface the tendency of the cells is to burst, loosening the muscular and bony systems and killing

the fish. Sometimes the fish are seen in large numbers floating dead on the water or lying on the shore, having been cast up by the waves. The fin rays in younger ribbon fishes are extraordinarily developed, some of them being several times longer than the body. The same name is also applied to a tun, though not ribbon-shaped, fish found in the Gulf of Mexico and around the West Indies. It has blackish-brown bands on a grayish body.

RIBS, in the human body, twelve pairs of bony arches constituting the walls of the chest. They are joined in front to the breast-bone, or sternum, and at the back to the spinal column. The last two pairs are free in front and are called *floating ribs*. In length the ribs increase gradually to the seventh, and then grow smaller. For illustration, see the article **SKELETON**.



Stripping Rice
in Japan

RICE, the grain that forms the principal food of one-half the population of the earth is a member of the grass family. It has been used for food for many centuries, and was known in the East long before it was introduced into Greece and Rome. It is now extensively cultivated on the lowlands of the tropical and semi-tropical portions of Southeastern Asia, China, Japan, Egypt, Southern Europe and several states of the United States. Its popularity in the Far East is much greater than in the western hemisphere, and in China and Japan it is of greater importance as a food than are corn and wheat in the United States. The annual crop amounts to 100 billion pounds, and ninety-six per cent of this amount is grown in Asia. In China and some other warm countries two crops a year are raised; the Chinese have 250 varieties of seed. The leading rice-growing states of the Union are Louisiana, Arkansas, California, Texas, and Missouri, in the order named. The production in the United States is increasing, but it does not yet meet the demands of the country, and a considerable quantity is imported.

The Rice Plant. Rice is an annual plant, of many varieties, but the principal ones grown in the United States are the *gold seed*

and the *white rice*. The stem is from one to six feet high, erect, simple, round and jointed; the leaves are large, firm and pointed, arising from very long, cylindrical and finely-striped sheaths; the flowers are disposed in a panicle, somewhat resembling that of the oat; the seeds are white and oblong, but vary in size and form in the numerous varieties. Rice requires a high temperature and an abundance of water. It thrives best on the lowlands of tropical or semi-tropical regions. The deltas of great rivers—the Ganges, the Irrawaddy, the Yang-tse-kiang, the Tigris, the Euphrates and the lower Mississippi—are the best rice fields in the world, because they are subject to flooding by overflow of the streams. Where sufficient water is not obtained by overflow, irrigation is necessary.

Planting and Tillage. The seed should be selected with care. In Oriental countries the seed is sown broadcast in highly fertilized mud, and the young plants are transplanted when they are two or three inches high. In the United States the seed is planted with a drill, as is wheat. After the seed is planted the ground is thoroughly wet, so the seed will sprout. When the plants appear above ground, the field is flooded to the depth of four or five inches, and the water is allowed to remain until the leaves float on the surface, when it is drawn off. The field is plowed and hoed, and the plants are allowed to root firmly. Then the land is again flooded, and the water is allowed to remain until the grain is ripe.

The rice field is divided by ridges or embankments into small sections which are separated from each other by canals, to facilitate flooding and drainage. Growing rice is of a beautiful dark green, and a field of it adds much to the beauty of the landscape. In the lowlands along rivers, the fields can usually be flooded by means of canals connecting with the river.



RICE

On higher lands it is often necessary to resort to pumping, as in the prairie regions of Louisiana, Texas and Arkansas. In some parts of China and Japan, the water is pumped up to terraces on the hillside by tread-mills which are operated by men and bullocks.

Harvesting. In the United States modern agricultural methods and machinery are employed in the rice industry, and the harvester is used for cutting the grain, but in Oriental countries the hand sickle is used. The sheaves are placed in shocks and allowed to stand until dry. When the grain is dry it is thrashed in an ordinary thrashing machine, and placed in sacks, ready for shipment.

Milling. Rice as it comes from the thrashing machine is known as *paddy*. The kernel is inclosed in a brown hull, which must be removed before the rice is ready for the market. In the United States this is done by a mill invented especially for the purpose. In Eastern countries the hull is removed in various ways, such as by pounding in stone mortars, treading the grain by animals, and pounding it with flails. However, American milling machinery has been introduced into some of the great rice markets of Indo-China. After the husk is removed the rice is polished and the grains are graded according to size, after which it is packed for shipment.

Food Value. Rice contains 12 per cent water, 2 per cent fat, 77 per cent carbohydrates, 8 per cent protein and 1 per cent ash. It does not have as high a food value as wheat or corn, because of the lack of ample fat and protein. The Japanese and Chinese usually eat with it, a sauce made from beans, Americans eat it with milk, or syrup. Polishing removes a very nutritious portion of the kernel; therefore the unpolished rice has the greater food value, though it sells at a lower price.

Other Uses. In India a distilled liquor called *arrack* is made from rice. The Chinese and Japanese also make a number of intoxicating drinks from it. Rice polish, bran and straw are used as food for stock. Sandals, hats and various other articles are made from the straw. The hulls are used for filling mattresses and in packing goods, and the polish is valuable as a fertilizer.

RICE, ALICE HEGAN (1870-), an American story-writer, born at Shelbyville, Ky. She achieved fame as the author of



Photo from Underwood & Underwood

RICE

These laborers stand all day in the mud and water of irrigated fields setting out rice shoots. They make very even straight rows. They work from twelve to fourteen hours daily at this back-breaking labor for wages of less than one dollar a day. The Japanese as a nation are wonderfully patient, industrious, and thrifty. It is not surprising that their country has progressed so fast.



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Like rice? Baked in a pudding with milk, eggs, and raisins? Most people do. And of course you want to know the peculiar conditions under which rice is grown. Read the article about it. In this scene, in Carolina, negro laborers, with mules are cultivating rice fields.



Photo from Keystone View Co., Inc.



1, 3, Lwing Gallows, 2, Keystone



RICE, PRINCIPAL FOOD OF HUNDREDS OF MILLIONS OF PEOPLE

At top, rice field in Hawaii, just before sunset, showing watery soil, necessary to growth Center, Japanese women winnowing and drying rice. At bottom of page, Chinese coolies plowing, preparing to plant rice.

[See over]



Mrs. Wiggs of the Cabbage Patch, a book which had one of the largest sales in the history of the American publishing business. The story appeals by reason of its wholesome humor, genuine sympathy, optimism and fidelity to real life. Its sequel, *Lovey Mary*, also had a wide sale. *Sandy, Mrs. Opp, A Romance of Billy Goat Hill, Calvary Alley, The Honorable Percival, Miss Mink's Soldier, Quinn, Turnabout Tales* (with husband), *Winners and Losers* (with husband), *The Buffer*, and *Mr. Pete & Co.*, are among her other books. She was a founder of the Cabbage Patch Settlement in Louisville, Ky. Several of her books have been translated into German, French, Danish and Swedish, and three have been dramatized. She is the wife of the poet Cale Young Rice.

RICE PAPER, a substance prepared from thin, uniform slices of the snow-white pith of a plant which grows in Formosa. Rice paper is prepared in China and is used in the manufacture of artificial flowers and by native artists for water color drawings.

RICHARD I, surnamed Coeur de Lion (the Lion-hearted) (1157-1199), king of England, second son of Henry II. He several times rebelled against his father, and in 1189, supported by the king of France, he defeated the forces of Henry, who was compelled to acknowledge Richard as his heir. On Henry's death, Richard was crowned at Westminster. The principal events of his reign are connected with the Third Crusade, in which he took part, uniting his forces with those of Philip of France. He won no important victory as a result of his undertaking, and after making a truce with the sultan he set out for England. While making his way through Austria he was taken captive and kept in prison for some time, until the payment of a large ransom.

RICHARD II (1367-1400), king of England, son of Edward the Black Prince, and grandson of Edward III, whom he succeeded in 1377. The first important event of his reign was the insurrection of Wat Tyler, in 1381 (see TYLER, WAT). Wars with France and Scotland, and the ambitious intrigues of the Duke of Lancaster, one of his uncles, disquieted the country for years. A quarrel having broken out between Richard's cousin, the Duke of Hereford, son of John of Gaunt, and the Duke of Norfolk, Richard banished them both, expressly providing, however, that Hereford should have the right

to inherit any property which might fall to him. The next year, 1399, John of Gaunt, Hereford's father, died, and Richard confiscated his estates. This dishonest act was the immediate cause of the king's fall. During his absence in Ireland, Bolingbroke, as the Duke of Hereford was called, landed in Yorkshire with a small force, and the king on his return to England was solemnly deposed by Parliament, and Henry was made king. Richard was imprisoned in the castle of Pomfret, where, it is believed he was murdered.

RICHARD III (1452-1485), king of England, the youngest son of Richard, Duke of York, who was killed at Wakefield. On the accession of his brother, Edward IV, he was created Duke of Gloucester, and during Edward's reign he served him with great courage and faithfulness. When Edward died in 1483, he left to Richard the care of his heir, Edward V, then thirteen years old, and the administration of the kingdom. Richard on being acknowledged Protector of the Realm took firm hold of the government, overthrew the party of opposition and after a time confined Edward and his little brother in the Tower, and had himself declared king by Parliament. At once plots were formed to rescue the princes. The Duke of Buckingham, one of the leaders in the uprising, was caught and executed. Richard's other powerful opponent, Earl of Richmond, the Lancastrian claimant of the throne, raised an army and came against him, and on August 7 the two armies met on Bosworth Field. Richard was defeated, and Richmond became king of England as Henry VII. See ROSES, WARS OF THE

RICHARDSON, SAMUEL (1689-1761), an English novelist, remembered chiefly as the author of the first work of English fiction that contained all essential elements of the novel. He received only an elementary education, and the greater part of his life was spent in the printing business, at first as an apprentice and later on his own account. When he was past fifty, he was asked by two booksellers to compose a "familiar letter writer," and he conceived the plan of having the letters tell a complete story. This story, told in letters, was published in 1740 under the title of *Pamela, or Virtue Rewarded*. In 1749 *Clarissa Harlowe* appeared, and was followed in 1753 by *The History of Sir Charles Grandison*. *Clarissa Harlowe* is

regarded as his masterpiece, while *Sir Charles Grandison*, in which he deals with unfamiliar characters of high life, falls somewhat below its predecessors. Richardson's novels, though wearisome through their excess of detail, give deeply sympathetic character pictures, develop a plot and have a love element, thus fulfilling the requirements of the modern novel.

RICHELIEU, *reesh lyo'* **ARMAND JEAN DUPLESSIS**, Duke de, Cardinal (1585-1642), a French statesman born in Paris. He was originally destined for the army; but when his brother Alphonse resigned the bishopric of Lugon, this was bestowed on him by Henry IV. He went to Paris in 1614 as deputy of the clergy of Poitou to the States-General, and insinuated himself into the favor of the queen mother, Marie de Medici, who obtained for him the post of grand almoner. In 1616 he was made secretary of state for war and foreign affairs. When Louis XIII quarreled with his mother in 1617, Richelieu was banished. In 1620, however, he managed to effect a reconciliation between the queen mother and her son.

In 1624 Richelieu was made a cardinal, and recalled to the Council of State. For eighteen years he was practically the ruler of France. He suppressed the political ambitions of the Huguenots, but allowed them religious liberty. He overthrew the great nobles by depriving them of privileges. He increased the influence of France among the nations of Europe by undermining the influence of the Hapsburgs, and did much to restore to France the prestige it enjoyed in the days of Henry IV. Richelieu was the founder of the French Academy, which is perhaps his most enduring monument.

RICHMOND, IND., the county seat of Wayne County, located 68 miles northeast of Indianapolis, and 40 miles from Dayton, Ohio. It is situated very near the Ohio state line on the Whitewater River and on the Pennsylvania, the Cincinnati & Ohio and the Indiana railroad systems. There are three electric and several bus lines which serve the city. The airport is four miles distant. The National Highway (number 40) and Federal Highway number 27 pass through the city.

There are 82 industrial concerns that produce commodities valued at \$30,000,000 annually. These products include threshers, kitchen cabinets, pianos, farm machinery, wire products, auto parts, clothing, flour

and dairy products; the city excels in the production of lawn-mowers and roses. Richmond has a large wholesale trade.

The principal institutions include the Federal building, the Morrison-Reeves public library, the law library, two parochial schools, 15 public schools and 36 churches, a state hospital for the insane, Reid Memorial Hospital and homes for the aged and for orphans. Earlham College occupies a campus of 120 acres on the west side of the city; it was founded in 1874.

The city maintains its own light and power plant, and the beautiful Glen Miller Park which covers 200 acres. The moving picture theaters have a seating capacity of 3,200.

The first white inhabitants came about 1808, but Richmond was permanently settled by Friends who emigrated from North Carolina and Pennsylvania in 1816. It has long been a prominent center of that denomination. The village corporation was established in 1818 and the city was chartered in 1840. Population, 1930, 32,493; it is 90 per cent native white.

RICHMOND, VA., the capital and largest city of the state, and throughout the Civil War, the capital of the Confederacy. It is situated on the James River about 100 miles from its mouth and 115 miles south by west from Washington. It is served by the Atlantic Coast Line, the Chesapeake & Ohio, the Richmond, Fredericksburg & Potomac, the Seaboard Air Line, the Norfolk & Western and the Southern railroads. There are two airports; more than 10 principal highways converge on the city. It is to be reached also by five interstate bus lines, two steamship and three interurban lines; 21 motor truck companies handle freight.

The city has an area of 24 square miles; it is built on a series of hills that rise from the river in altitudes varying from 170 to 250 feet above the sea. The summits of these hills are plateaus upon which the chief residential sections are located.

Interesting Features. The chief point of interest is Capitol Square with an area of 12 acres occupying the central part of the city. Here is situated the state capitol, completed in 1789 on a model of an old Roman Temple at Nimes, France, and there known as *Maison Carrée*. This model was sent to Virginia by Thomas Jefferson and is still preserved in the Virginia State Library. Beneath the dome is a life-size statue

of George Washington by Houdon. Within this square are also the state library, the governor's mansion, Saint Paul's Church and the \$1,400,000 city hall which is one of the finest buildings in the city. On West Broad Street is the handsome Union Station that cost \$3,000,000.

Near the west gate of Capitol Square is a bronze equestrian statue of Washington by Crawford; it is considered one of the finest works of its kind in America. The base is surrounded by bronze figures of Thomas Jefferson, Patrick Henry, John Marshall, George Mason, Thomas Nelson and Andrew Lewis. Not far away are the statues of Henry Clay, Stonewall Jackson, Governor Smith and Dr. Hunter McGuire.

Other buildings of historic interest are the house occupied by Jefferson Davis while president of the Confederacy and now used as a museum of Confederate relics, the home of Chief Justice Marshall, the home of Robert E. Lee, the Virginia State Library, the oldest Masonic Hall in the United States, the Confederate Memorial Institute, the World War Memorial Carillon, the Soldiers' Home and the Valentine Museum. In addition to Capitol Square there are 15 other parks. The largest are Bryan Park and William Byrd Park. Labby Hill, a part of Labby Park, has a monument to the Confederate soldiers and sailors; it commands an excellent view of the river and the opposite shore.

In Lee Circle are the equestrian statue of General Robert E. Lee, one of the finest pieces of art in the city, and monuments to Jefferson Davis, Stonewall Jackson and J. E. B. Stuart. A number of beautiful cemeteries contain the graves of thousands of Union and Confederate soldiers; the most interesting is Hollywood Cemetery, the burial place of Presidents Monroe and Tyler, of Jefferson Davis and a number of noted Confederate generals.

Public and private agencies maintain 10 golf courses, 16 parks with 780 acres and 20 playgrounds are available. There is a municipal swimming pool and the municipal auditorium has a capacity of 3,500, the 16 theaters can seat 20,000 people.

Other Institutions Among the educational institutions are the Medical College of Virginia, the University of Richmond, the College of William and Mary (Richmond division), the Presbyterian Training School, a city mechanical training school, the Union

Theological Seminary of Virginia and the Virginia Union University (for Negroes), and the University of Virginia (Richmond division). The libraries include the state library of 365,000 volumes, the public library with 110,000 volumes, the state law library and the library of the Virginia Historical Society. There are over 75 public and private school buildings. The charitable institutions include 19 hospitals, the city almshouses, the retreat for the sick, the city orphan asylum, Lee Camp Soldiers' Home and Saint Joseph's Villa.

Churches The 216 churches are noted for their historic associations more than for their architecture. Chief among these is the Saint John's Episcopal Church, built in 1740 and still in an excellent state of preservation and used for religious services. Here the convention met in 1775 to receive the report of the First Continental Congress when Patrick Henry made his celebrated speech ending with the words, "But as for me, give me liberty or give me death." Monumental Church stands upon the site of a building in which in 1788 the convention met that ratified the Constitution of the United States. In Saint Paul's Church near the Capitol, Jefferson Davis was attending service when notified that Richmond must be evacuated. General Lee was also a regular attendant here.

Industry. Richmond has more than 535 industrial organizations with a total of \$275,000,000 capital. It is one of the most important tobacco markets in the United States, with tobacco factories employing thousands of workers. Manufactures listed according to importance are: plug and smoking tobacco, cigars, cigarettes and leaf tobacco, paper and paper products; printing, publishing and engraving; iron, steel and machinery, flour and lumber. Abundant power is furnished by the falls in the James River. The annual output of all industries is valued at more than \$300,000,000. Richmond distributes her products to a large area including southeastern Virginia and parts of North Carolina and South Carolina. It is also connected by regular lines of steamers with the leading ports on Chesapeake Bay and the Atlantic.

History. Captains Smith and Newport visited the site of Richmond soon after 1607. William Byrd of Westover is credited with the actual founding of the city. Richmond

was settled in 1737 and was incorporated in 1742. It became the capital of Virginia in 1779, although still a small village. In its statehouse were passed the celebrated Virginia Resolutions (See KENTUCKY AND VIRGINIA RESOLUTIONS), and the ordinance of secession for the state of Virginia; here also occurred the famous trial of Aaron Burr. From 1861 to 1865 the city was the capital of the Confederate States. Because of this, during the Civil War it was the main point of attack by the Federal armies in the East, and no less than fifteen battles and twenty-five skirmishes occurred during the attempt of the Federal troops to capture the city. It was evacuated by the Confederate forces on April 2, 1865, at which time a fire started in the public buildings destroyed a large part of the city. After the close of the war the city was rebuilt and began its later prosperous history. Population in 1930, 182,929.

RICHTER, JOHANN PAUL FRIEDRICH, commonly called JEAN PAUL (1763-1825), a German author. In 1781 he entered the University of Leipzig to study theology, but soon changed his plan and devoted himself to literature. From 1787 to 1794 he taught school; but during these years he also wrote and published his *Greenland Lawuits*, *Selection from the Devil's Papers* and the romance, *The Invisible Lodge*. The last-named work brought him fame. Then followed in rapid succession, and with decided success, *Hesperus*, *Life of Quntus Fislein and Flower*, *Fruit and Thorn Pieces*. But his best works are the romances *Titan* and *Wild Oats* and his philosophical treatise *Introduction to Aesthetics*. *Levana*, a work on the education of women and children, has some pedagogical merit. Richter is the greatest humorist of modern German literature, but his works are unreliable and are little read on the American continent.

RICHTHOFFEN, BARON MANFORD VON (1892-1918), Germany's "ace of aces" in its aviation service in the World War, in command of the "Flying Circus." In ability and daring the war on either side did not develop a more masterly airman. Before he met his death in aerial combat in the last year of the war he was credited with the destruction of eighty enemy airplanes.

RICKENBACKER, EDWARD ["EDDIE"] VERNON (1890-), the most renowned American aviator developed by the World

War. During the conflict, from which he emerged uninjured, he was credited with the destruction of twenty-five enemy airplanes, and was given the distinctive title of "the American ace." For his valor in combat he was awarded the Congressional Medal of Honor and the Distinguished Service Cross by the United States government, and the Croix de Guerre and nomination to the Legion of Honor by France. He wrote *Fighting the Flying Circus* (see article above).

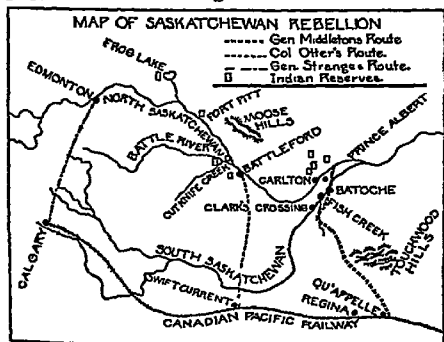
On returning from the war he became vice-president of the Rickenbacker Automobile Company, which failed, then allied himself with aviation interests. Successively he was vice-president and director of the Fokker Aircraft Corporation, vice-president of American Airways, assistant to the president of Aviation Corporation, and director of public relations of North American Aviation.

RICKETS, *rik'ets*, a disease to which undernourished children are especially subject. Children between the ages of one and two are most frequently attacked. Softening of the bones is the most striking symptom, and as a result the legs become bowed, the elbows, wrists, knees and ankles become enlarged, the spine is bent forward or sideways, and the breast bone protrudes. Any child so afflicted should be under the supervision of a reliable physician and receive careful nursing. Fresh air, nourishing food, a diet suited to the child's needs and hygienic clothing are essential. See VITAMINS.

RIDLEY, NICHOLAS (about 1500-1555), an English churchman, one of the early martyrs to the Protestant faith. He was educated in Pembroke Hall, Cambridge, and in France, where he spent three years. Returning to England in 1533, he was made proctor to the University of Cambridge. Archbishop Cranmer made him one of his chaplains, and later he was chaplain to Henry VIII. He was appointed canon of Canterbury and of Westminster, and rose to the position of bishop of Rochester and of London. He also assisted in the preparation of the Thirty-nine Articles. On the death of Edward VI, Ridley supported the cause of Lady Jane Grey, and when Mary came to the throne he was in a dangerous position. In 1553 he was arrested and imprisoned in the Tower of London. The next year he was tried for heresy, found guilty, and burned at the stake.

ED'PATH, JOHN CLARK (1841-1900), an educator and historian, born in Putnam County, Ind., and educated at De Pauw University. He was for a time professor of languages in Baker University, Baldwin, Kan., then professor of English and history in Asbury (now De Pauw) University, of which he became vice-president. He was largely instrumental in securing the endowment that placed this institution on its present footing and changed the name to De Pauw. Dr Ridpath devoted the last few years of his life to literary pursuits, and he was the author of a *Popular History of the United States*, a *Cyclopedia of Universal History*, *Life of James A. Garfield*, *Life and Times of Gladstone*, *Great Races of Mankind* and several other historical works.

RIEL, LOUIS (1844-1885), a Canadian agitator, was born at Saint Boniface, Man. Though generally known as a half-breed, his ancestry was mainly French. From 1866 to 1868 he worked at various occupations in Minnesota. In 1869 the transfer of the territorial rights of the Hudson's Bay Company to the Dominion government led to an armed revolt of the half-breeds under Riel's leadership. In October a party under Riel turned back the new governor (Hon Wm McDougall) and later captured Fort Garry (Winnipeg). After holding a convention which



passed a bill of rights, a provisional government with Riel as president was formed. So far the metis or half-breeds were within their rights, but the execution of Thomas Scott, an Orangeman from Ontario, roused the whole of English-speaking Canada against them. An expedition under Colonel Wolseley captured Fort Garry, but Riel escaped. He was not arrested or prosecuted, and several years later was elected to the House of Commons,

from which he was expelled after a year. He was again elected in 1874, but his seat again became vacant after he was outlawed in February, 1875. For nine years he kept out of public notice, spending five years in Montana. In 1884 in response to a call from his countrymen, who had moved west to the Saskatchewan district, he returned to Canada. His own rashness and the harshness of the officials caused another rising, known as the Saskatchewan Rebellion, which was crushed after hard fighting. Riel was imprisoned at Regina, was tried and found guilty of treason, and was executed in November, 1885.

RIENZI, *re en' ze*, COLA DI (about 1313-1354), a popular leader of Rome, in which city he was born and educated. Aroused by the oppression of the people under the nobles, he instigated a popular rising, assuming the title of consul of orphans, widows and the poor. For three years he harangued the people and menaced the nobles, who, thinking him mad, made no effort to suppress him. At last, in 1347, in the absence of the governor of Rome, he assembled his friends upon Mount Aventine, delivered a fiery discourse, and induced them all to subscribe to an oath for the establishment of a republican government. The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families and compelled those who remained to do him homage. In overriding the Pope and imposing heavy taxes he lost his hold on the people and was forced to leave Rome. He attempted, two years later, to gain the support of Emperor Charles IV in his attempt to reconquer Rome, but the emperor imprisoned him and handed him over to Pope Clement at Avignon. Innocent VI released Rienzi and sent him to Rome to oppose another popular demagogue, and the people received him enthusiastically, but after a turbulent administration of a few months he was killed.

RIESENGBIRGE, *re' zen ge beer' geh*, a mountain range of Europe, separating Silesia from Bohemia and forming a part of the Sudetic Mountains. It contains the loftiest mountains of the eastern part of Europe, one peak being 5,265 feet high.

RIFLE, *ri' fl*, a firearm having spiral grooves in the interior of the barrel. The rifle is one of the principal weapons of modern armies. Its great advantage over the musket lies in the spiral grooves in the barrel, since these impart a rotary motion to the

bullet that keeps it in its direct path. The number and depth of these spiral channels varies in different rifles, the most approved form having the grooves and ridges of equal width and the spiral turning more sharply as it nears the muzzle.

The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet, having a rotary action, is preserved in its direct path, without being subject to the aberrations that injure precision of aim in firing with unrifled arms.

Rifles were invented in Germany in 1498 and have been used as military weapons since 1631. In 1851 the first rifle firing in elongated bullet appeared, under the name of the Minié. It was succeeded in 1853 by the Enfield rifle. Next came the breech-loading rifle. In this rifle the breech is closed by a block, which contains a piston, or striker, the latter exploding the cartridge by the force of a strong spiral spring passing round it.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve, contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader. The automatic rifle is the magazine rifle's successor.

In 1918 the Browning automatic or machine rifle was adopted by the United States army. It is a gas-operated water-cooled gun, weighing about fifteen pounds, and it can be operated from the shoulder or the hip. The pressure of the gas that expels the bullet may be as high as 50,000 pounds to the square inch. A portion of the gas is used in operating the gun, so that it can be fired continuously. The magazine holds forty cartridges, and it is possible to fire over forty shots a minute. On leaving the muzzle the bullet travels at a rate of 2,300 feet per second, and accurate shooting may be done at a range of a mile or more. The penetrating power of the bullet is astonishing. It will go nearly four feet into the solid earth; will penetrate five feet of soft wood or $\frac{1}{2}$ inches of hardened steel. If a half dozen men were standing one behind another, the bullet would pass through all of them.

The ordinary sporting rifles have been equipped with the improvements that were used in military arms, but as the purpose of the sporting rifle is different, all improvements have been modified and some new ones made. For instance, the sights have been so arranged as to aid the amateur, the stocks have been omitted and the weight of the rifle has been lessened, until it can be handled with moderate ease. Improvement in the ammunition for the sporting rifle has added as much to its efficiency as the improvements in the gun itself.

The World War lent a great impetus to the manufacture of rifles and ammunition in the United States. From the beginning of the war until July, 1918, over 1,887,000 rifles were made in the country, and the manufacture of cartridges reached an average daily production of over 15,000,000.

RIGA, *re' gah*, LATVIA, a seaport and the capital of the country, which formerly was one of the provinces of the Russian Empire. Riga is situated on both banks of the Duna, about ten miles above the mouth of the river, on the Gulf of Riga, an arm of the Baltic. The city is 363 miles southwest of Petrograd, and before the World War was second in importance only to the Russian capital among the Baltic ports, carrying on an extensive export trade in flax, hemp, timber, linseed, grain and eggs. It was also an important manufacturing center and supported numerous charitable and educational institutions.

The town was founded in 1201, and from an early period had a strong German element in the population. The oldest part of the city has the appearance of a medieval German town. Because of its proximity to Petrograd, Riga has frequently been an objective point in military operations. During the World War it was several times bombarded, and in 1917, after the collapse of Russia, it was captured by the Germans without resistance. The defeat of Germany a year later again changed the situation, but the city soon fell a prey to the Bolshevik army of Lenine. In the spring of 1919 Lettish troops, with the assistance of German forces, drove out the Bolsheviks. Population, 1930, 377,917.

RIGA, or **LIVONIA**, **GULF** of, an arm of the Baltic, which washes the coasts of two nations, Latvia and Esthonia. It is 100 miles long and the greatest width is seventy miles. The entrance is almost closed by Oesel Island. The chief river flowing into it is the Duna.

RIGGS, KATE DOUGLAS WIGGIN (1859-1923), one of the foremost of American story-writers, whose *Rebecca of Sunnybrook Farm* has been pronounced the best girls' story since *Little Women* was written. She was born in Philadelphia, and in 1877 went to live in California, establishing there the first three kindergartens for poor children on the Pacific coast. In 1895 she married George C. Riggs. She has received a high literary degree from Bowdoin College. Her sympathy with children and penetrating knowledge of child nature, gained through many years' experience as a trained kindergarten, have made three of her books, *The Training of Children*, *Children's Rights* and *The Republic of Childhood*, invaluable as teaching aids. She is an extremely prolific writer, and besides the many volumes of verse and stories she has arranged or written, some of them in collaboration with her sister Nora Archbald Smith, she has to her credit *Timothy's Quest*, *Penelope's Irish Experiences*, *The Story of Patsy, Susanna and Sue*, *The Birds' Christmas Carol*, *The Diary of a Goose Girl*, *Mother Carey's Chickens* and many others.

RIGHT OF WAY, the right of passing over land which is not one's own. Rights of this kind are public, if enjoyed by everybody; private, if enjoyed by a certain person or class of persons. Wherever there is a public right of way, there is a highway. A right of way is usually granted when one purchases a tract of land which is cut off from a public highway by land owned by another. If this land is owned by the one who sold the tract, a right of way is implied in the sale.

RIIS, rees, JACOB AUGUSTUS (1849-1914), an American journalist, social worker and author, was born and educated at Ribe, Denmark. He emigrated to America at the age of twenty-one, and for six years engaged in manual labor. He then became a reporter on the *New York Tribune*, but soon joined the staff of the *Sun* as a police reporter. The work that made Riis so widely known was the outgrowth of his experience in this position. His sympathies for the poor and the unfortunate led him to urge improvements in police methods and the undertaking of measures for permanent relief of the congested district in lower New York. He was influential in securing better tenement houses and the establishment of playgrounds and

small parks. In 1897 he was secretary of the New York Small Parks Commission. His last years were devoted to writing and lecturing, and at the time of his death he was regarded as one of the most prominent social workers of his time. His most important publications are *How the Other Half Lives*, *Out of Mulberry Street*, a collection of fiction; *The Children of the Slums*, and *The Making of an American*. One of his later works, *Theodore Roosevelt, The Citizen*, has been widely read.

RILEY, JAMES WHITCOMB (1853-1916), the "Hoosier Poet" and most beloved American poet of his generation. Although much of his verse is written in Hoosier dialect, some of his finest outpourings are in purest English. The pathos and humor of his descriptions of scenes of simple life, his keen interpretation of child life and his kindly understanding of local character, have made him one of the most widely read of modern poets.

Riley was born in Greenfield, Ind. After receiving a common school education he worked for a time as an itinerant sign painter, and later performed in a theatrical company. It was during his travels with this company that he became so intimately acquainted with the Indiana life which his poems reveal. His literary work began in 1875 with contributions to newspapers and magazines, which he wrote under the pen name of Benjamin F. Johnson, of Boone.

Among his volumes of verse are *The Old Swimmer's Hole* and *Leven More Poems*, *Character Sketches and Poems*, *Afterwhiles*, *Green Fields and Running Brooks*, *A Child World*, *An Old Sweetheart of Mine*, *Rhymes of Childhood* and the *Book of Joyous Children*. An edition of his collected works also has been published.



JACOB AUGUSTUS RIIS



JAMES WHITCOMB RILEY

RINDERPEST, or CATTLE PLAGUE, *playg*, an infectious disease which attacks cattle, and, sometimes, sheep. It is unknown in North America, but is generally prevalent in Europe, and Central Asia, where enormous losses have been caused by epidemics of rinderpest. About ninety per cent of the animals attacked die, but if an animal survives it is thenceforth immune. The disease is conveyed from one country to another by means of cattle afflicted with it or through infected hides, wool and food. It may also be carried in the manure of sick animals, and by attendants. The cause of the disease is a minute organism or microbe (see BACTERIA AND BACTERIOLOGY), which is so small that it is very difficult to discover, though experiment has proved that it is withheld by the finest of bacterial filters.

The first sign of the disease is a high fever and a rapid pulse. As the disease progresses the respiratory and digestive organs are strongly affected. There is congestion of the mucous membrane of the mouth and throat, and ulcers are formed. In severe cases death ensues in from four to seven days. No remedy for the disease has been found, but epidemics may be held in check by inoculating healthy animals with a serum prepared for this purpose. All afflicted animals should be killed at once and their carcasses be disposed of in the shortest possible time.

RINEHART, rinehart, MARY ROBERTS (1876-), one of the most popular of present-day American novelists, was born in Pittsburgh, Pa. After high-school graduation, she entered training as a nurse, and many of her subsequent short stories are founded upon her observations within hospital walls. In 1896 she married Dr. Stanley Marshall Rinehart. During the World War she enlisted in the American Red Cross, serving for a year in France and Belgium, and two of her latest books, *The Amazing Interlude* and *Hospital Love Stories*, are founded upon her personal experiences and impressions there. Other popular stories include *The Circular Staircase*, *Amazing Adventures of Letitia Carberry*, *Where There's a Will*, *The Street of Seven Stars*, *K, Tish, Bab-A, Sub-Deb* and *Dangerous Days*. Several of her books have been dramatized for the moving-picture stage. Particularly pleasing were the film presentations of the *Sub-Deb* stories, which were featured by that petite artist, Marguerite Clark. The *Letitia Carberry*

sketches have also been put on the films, featuring the competent "Tish." Late books from Mrs. Rinehart's pen are *Sight Unseen* and *the Confession*, *A Poor Wise Man*, *Affinities* and *Other Stories*, *More Tish*, *The Breaking Point*, *The Truce of God*, *The Out Trail*, *Tish Plays the Game*, *Lost Ecstasy*, *Two Flights Up*, *This Strange Adventure*, *The Romantics*, *The Door*, *My Story*, *The Book of Tish*, *Miss Pinkerton*, *The Album*, *The State Versus Elinor Norton*, and *The Doctor*.

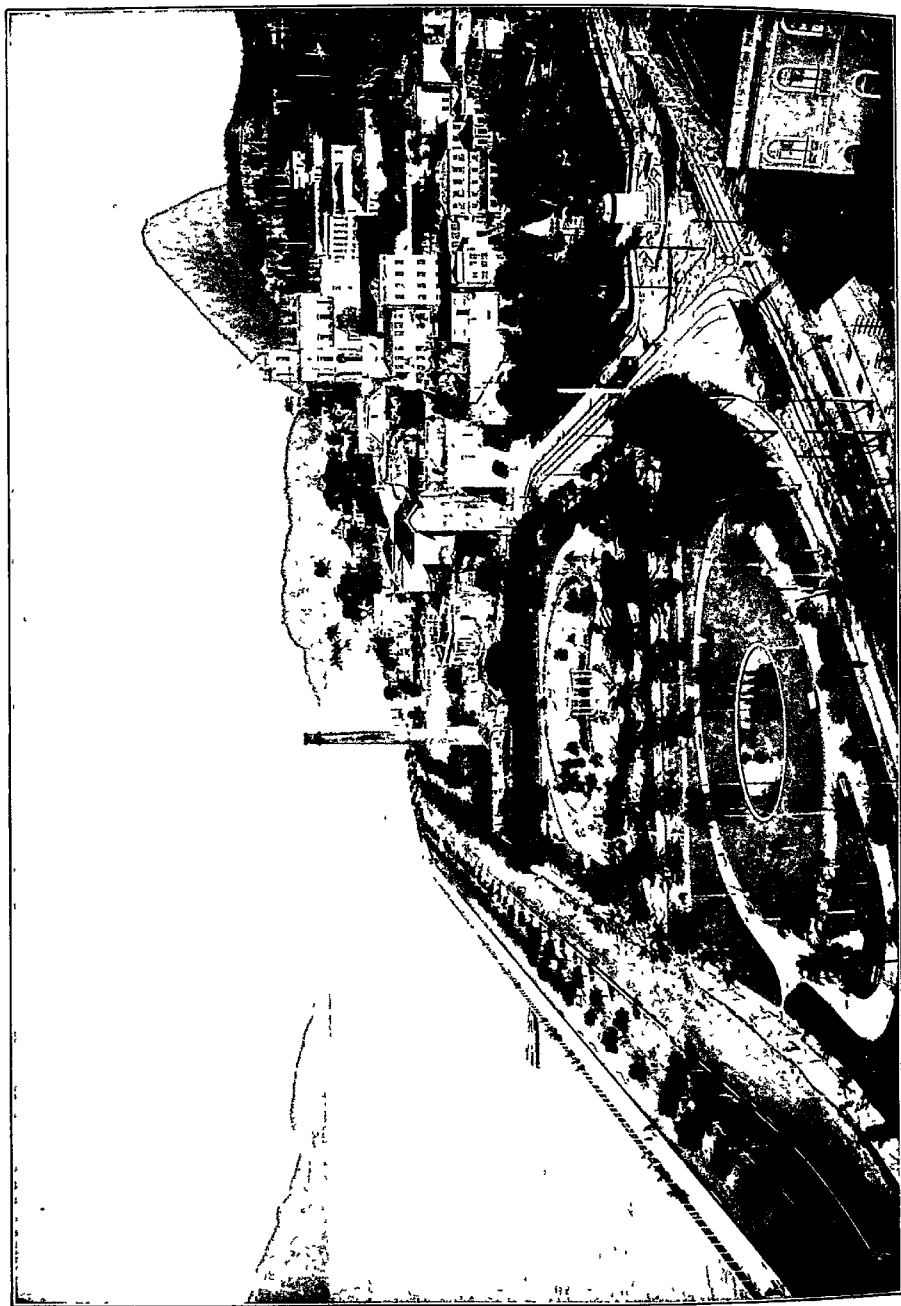
RING, an ornament of gold or other metal, worn on the finger, a custom which dates back to the beginnings of human history. The form worn in early times was the signet ring, which was used as an emblem of authority and was a sign of confidence and favor. Rings were also worn as ornaments, and the Hebrews and Persians employed precious stones in them.

The use of betrothal and wedding rings originated with the Jews. The wedding ring is worn on the left hand, to denote a wife's subjection to her husband, and on the third finger because from it a vein is sentimentally supposed to go direct to the heart.

Many uncivilized people wear rings to adorn the nose, ears, arms and toes. Rings also have been worn as talismans and as charms against evil. Before the invention of coinage, rings were used as money, and even today copper rings are common among African traders.

The ring of the Pope has an interesting significance. Upon coronation the Pope is presented with a ring by the city of Rome, which bears his name and a picture of Saint Peter in a boat. He subsequently signs each official decree with this signet. Upon his death his ring is broken, and a new one is made for his successor.

RINGWORM, a skin disease, so called because it spreads in rings. It is caused by a minute fungus, or vegetable mold, and usually occurs on the scalp or face. When on the scalp, it causes the hair to break off, loosen and fall out; if on the face, it causes soreness. Wherever it occurs, ringworm subjects the patient to the annoyance of constant itching. When the disease appears a physician should be consulted, for it will continue to spread until the fungus is killed. Ointments containing mercury or sulphur are usually effective. But, before applying them, the affected places should be shaved and the roots of the dead hairs should be pulled out.



RIO DE JANEIRO, BRAZIL

View of the water front and the harbor dotted with islands, one of which is the Sugar Loaf Improvements such as are here shown extend for several miles along the harbor, and were built at a cost of \$17,000,000



The Cathedral

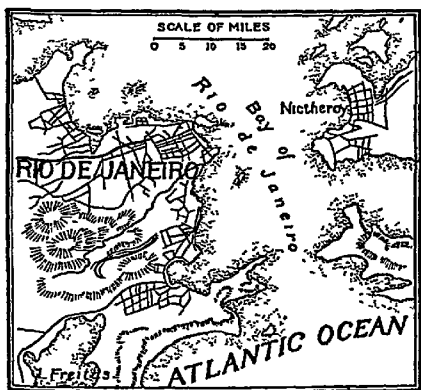
RIO DE JANEIRO, *re' o da sha na'ro*, BRAZIL, the city on the "most magnificent harbor in the world," is the capital of the republic and the second largest city of South America. It is situated on the west side of the Bay of Rio de Janeiro, 5,204 miles from London, 4,748 miles from New York and 5,160 miles from New Orleans. The bay is surrounded by mountains whose sides are covered with verdure, and this setting gives the city a remarkably picturesque site. The city extends along the bay for about fifteen miles, and a number of spurs of the mountains enter within its limits. Like most Spanish cities, it contains a number of squares, or plazas, around which the important buildings are grouped. The chief of these is surrounded by the city hall, the Senate house, the mint and other public buildings, and it is near the imperial palace formerly occupied by the emperor. In the older part of the town the streets are narrow and irregular. This is the commercial section and contains the most important buildings, such as the customhouse, the postoffice, the exchange, the Hospital of Santa Casa da Misericórdia, the National Academy of Fine

schools, the Hydrographic Institute, historical and geographical societies, the national library, with over 300,000 volumes and many manuscripts, numerous schools of medicine and surgery and a national conservatory of music. Since the latter part of the nineteenth century, Rio de Janeiro has been transformed from a typical South American city, closely resembling the towns of the Old World, into a modern American city with all up-to-date conveniences. The streets are broad and well-paved, a boulevard has been constructed along the bay at an expense of \$17,000,000, the entrance to the harbor has been deepened so that the largest ships now anchor at the numerous piers; magnificent public buildings have been erected, and Sugar Loaf, one of the mountains at the entrance of the bay, has been connected with the city by an aerial trolley.

Rio de Janeiro is one of the chief commercial ports of South America and is noted for its shipments of coffee, which exceed those of any other city. It has regular steamship communication with the leading ports of the United States and Europe. It is also connected by railway with surrounding towns and the rich agricultural districts in its immediate vicinity. The manufactures are comparatively unimportant. Chief among them are textiles and flour and grist mill products, these are consumed largely at home.

The place was first settled by the French in 1555, but two years later they were dispossessed by the Portuguese, who in 1567 founded the city. In 1640 it was captured by the Dutch, and about 1750 it became the capital of Brazil. From 1808 to 1821 it was the residence of the king of Portugal. Population, 1933, estimated, 1,500,000.

RIO DE LA PLATA, *plah'tah*, an estuary formed by the Parana and Uruguay rivers in South America, is really a broad arm of the sea extending inland between Argentina and Uruguay for more than 200 miles. It is 143 miles wide at its mouth and discharges a volume of water next to that of the Amazon. The rivers bring down large quantities of silt, and the estuary is gradually filling up. It has a strong current, and shoals and narrows are constantly forming, making navigation difficult and dangerous. The best harbors are those at Montevideo, Buenos Aires and La Plata. The estuary was discovered by Diaz de Solis in 1516, and given its name, which means *silver river*, by Sebastian Cabot.



Arts, the museum and the polytechnic institute. The public arsenal and theaters are also in this section. The leading educational institutions include the military and naval

RIO GRANDE, *re' o grahn'da*, a river famed in two countries, forming the boundary between Texas and Mexico. It rises in the southwestern part of Colorado, flows southward through New Mexico, then southeastward, and empties into the Gulf of Mexico, near Brownsville, Tex. It is about 2,000 miles long, and it is navigable for small boats in the rainy season for 250 miles. Along its middle course much of its water is used for irrigation, and during the summer portions of its bed may be dry. The valley of the Rio Grande has been the scene of numerous disturbances between Mexico and the United States.

RIO NEGRO, *re' o na'gro*, a river of South America, the largest tributary of the Amazon from the north, rises in the southeastern part of Colombia, flows south into Brazil, then southeast, and joins the Amazon about fifty miles above the Madeira. The main river is formed by the union of the Guainia and the Uaupes; some geographers consider one of these streams, and some the other, to be the source of the river. The Rio Negro is navigable for ocean ships to Manaus, a thriving city ten miles above its mouth. Its entire length is 1,400 miles.

RIOT. By the common law a riot is an unlawful assembly of three or more persons, which has actually begun to execute the purpose for which it assembled, by a breach of the peace and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose, to the terror of the people, although they had no such purpose when they assembled. The penalty for those convicted of engaging in a riot is fixed by the statutes of the different states. If the rioting leads to loss of life, the penalty is more severe than when it results in the destruction of property only. Those who incite others to riot are held to be equally guilty with those who actually engage in creating the disturbance, even though they may be absent.

RIPARIAN RIGHTS. The owner of land bordering on a stream that is not navigable owns that portion of the bed of the stream that borders his land as far as its middle. He also has the right to a reasonable use of the water. However, he cannot use all the water, neither can he pollute the water, nor change the course of the stream, if by so doing he will interfere with like rights of those living farther down the stream. These lawful privi-

leges are known as *riparian rights*. The term comes from the Latin word *ripa*, meaning *river bank*.

RIP VAN WINKLE, the hero of Washington Irving's delightful sketch by the same name. He is an idle, good-natured, hen-pecked scapegrace, who neglects his patch of maize and potatoes in a small village near the Hudson River, and, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried but termagant wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon*, who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is told to serve them, and while doing so he tastes again and again of the liquor he hands, till his senses forsake him.

He awakens on a bright summer morning to find his dog gone, a rusty firelock by his side, and his beard a foot long. When he returns to the village, he finds new buildings, new names on the shops, new faces at the windows. His own house is fallen into decay, his wife is dead. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognized by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn.

The story has been often dramatized, but no version has long held the stage except Boucicault's, with which the name of Joseph Jefferson is identified.

RISTORI, *re sto're*, ADELAIDE (1822-1906), a famous Italian tragic actress, the daughter of strolling players. She made her debut when very young, won favor, especially, as Francesca da Rimini, and before she was twenty was recognized as the foremost Italian actress of her time. In 1846 she was married to Marquis Capranica del Grillo, and she withdrew from the stage for two years. For a time, during the French siege of Rome, she served as a nurse in the hospitals. On returning to the stage she was more popular than ever, and created a sensation at Paris even when Rachel was at the height of her power. Ristori's greatest rôles were Mary Stuart, in Schiller's drama of the same name, and Elizabeth, in a play by Giacometti.

RIVERS. Rivers have their beginning in rain drops. Some of the rain is soaked into the earth, but a portion of it runs off down the slopes and finally reaches the sea. An embankment by the roadside after a shower will furnish one with an illustration of all the facts about the formation of a river. The rain drops collect into little rills which unite to form larger rills, and these join one main stream that carries the water down the embankment. Rivers are formed in a similar manner, but on a larger plan. They usually have their origin far up in the mountains or hills, in a spring or a melting glacier. These mountain brooks unite to form larger brooks, which in turn unite to form a creek, and numerous creeks unite to form the main stream. This is the river, although it may be small. The creeks are the tributaries. The land bordering on the stream forms the *banks* of the river. That on the right when the observer faces down stream is the *right bank*; that on the left is the *left bank*. A *river system* includes the main river and all its tributaries. The region drained by a river system is a *river basin*. The height of land separating one river system from another is a *divide*.

Rivers receive their water from rain and snow, and from underground water. One-fourth of this quantity of water reaches the sea through rivers. Snow-capped mountains and glaciers sustain an important relation to rivers, since the melting snow and ice supply them with water during the summer, and in arid regions prevent them from running dry.

The rise and fall of rivers is due chiefly to irregularity of the rainfall over the river basin. A period of heavy rainfall is likely to cause floods. Excessively warm weather in early spring in those regions having a heavy fall of snow is also likely to cause floods. In periods of drought the rivers have their volume of water greatly reduced, and in arid regions they may run dry. Rivers fed largely from underground sources maintain a comparatively uniform volume. Forests are also important agents in preserving uniformity and preventing floods, because ground covered with forests absorbs a much larger portion of the rainfall than does the open country.

Work of Rivers. The form and size of a river channel depend upon the size of the stream and the degree of slope. The steepest

slope is usually in the upper part of the channel, where the stream and its tributaries have great velocity and consequently great force, often sufficient to enable them to remove from their bed all but the heaviest rocks. In this part of the course the channel is narrow, with steep banks, and usually it is free from bends.

The middle course is characterized by a more gentle slope, with lower banks and a wider channel. The current is slower, and is deprived of much of its power of transportation; consequently the large pebbles and coarse gravel which the stream carries along in its upper course are dropped here, and we find the river bed and the banks covered with rounded pebbles. As this material is deposited it fills up the channel, causing the stream to become broader and more shallow. In this part of the course there is still sufficient velocity to the current to enable it to carry the finer silt to the lower part of the course where it is deposited. The current is not strong enough to remove obstructions, so the river flows around them, and for this reason a river may have a number of great curves in its middle course. Among large rivers the Mississippi affords the best illustration of this feature. Moreover, obstructions in the bed of the stream catch more or less of the silt, and by this constant addition of material in time become low islands.

The lower course is characterized by low banks, a broad channel and a slow current. Much of the silt brought from the upper and middle parts of the course is deposited along the banks and on the adjoining land whenever there is an overflow, forming broad alluvial plains noted for their fertility. A portion of the silt is also deposited on the bed of the stream, so in this part of its course the river is constantly raising itself to a higher level. The Mississippi affords the most remarkable illustration of this feature, for here the river is higher than the surrounding country and disastrous floods are frequently caused by breaks in its banks.

Canyons and Ravines. In the work of rivers we see the most striking illustration of the old proverb:

"Water dropping day by day
Will wear the hardest rock away."

No rock is so hard that running water will not wear a channel in it. Some rocks—such as limestone and sandstone—wear more rapidly than others, and wherever rivers flow

through limestone or sandstone regions we find in places deep channels with nearly perpendicular walls. Such channels are called *canyons*. Some of these canyons, notably the Royal Gorge in Colorado, the Grand Canyon of the Yellowstone and the Grand Canyon of the Colorado, are among the most stupendous wonders of the world. Small tributaries to a river usually wear their channels down to a level with the main stream, forming narrow gorges called *ravines*.

Estuaries and Deltas. Where a river enters the sea, through a sunken or drowned valley which the tide ascends, its mouth is a broad estuary like the Gulf of Saint Lawrence and the Rio de la Plata. However, when rivers enter the sea by gentle flow the meeting of the current and the tide causes most of the silt to be deposited at the river's mouth. In this way large alluvial plains called *deltas* are formed. The deltas of the Nile, the Rhone and the Mississippi are the most noted in the world.

Related Articles. The important rivers of the world are listed in the articles on the various countries in which they are found. For additional information consult the following titles.

Alluvium	Delta	Flood Plain
Basin	Divide	Rain
Canyon	Erosion	Valley
Cataract	Flood	Spring

RIVERSIDE, CALIF., the county seat of Riverside County, sixty-five miles east of Los Angeles, on the Santa Ana River and on the Union Pacific, the Atchison, Topeka & Santa Fé, the Southern Pacific, and the Pacific Electric railroads. The city has Riverside and Arlington airports. Riverside is noted for its beautiful streets, drives and public parks, and it has a number of hotels that accommodate many winter visitors. It is in one of the richest orange-growing sections in the world; close to the city are 20,000 acres in oranges. There are also grown lemons, grapes, figs and other fruits. The city has a Carnegie Library, a courthouse, an Indian school and a state citrus experiment farm. It was settled in 1870, incorporated in 1886, and has adopted the commission form of government. Population, 1920, 19,341; in 1930, 29,696, a gain of 53 per cent.

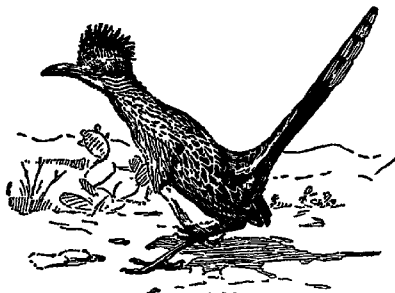
RIVES, reevs, AMÉLIE, Princess Troubetzkoy (1863-), an American novelist, born in Richmond, Va., of a distinguished family. In 1888 she married J. A. Chandler, whom she subsequently divorced, and in the same year published her first book, a collection of tales entitled *A Brother to Dragons*. The

next year she created a sensation with *The Quick or the Dead*. Among her later works are *The Golden Rose*, *Pan's Mountain*, *World's End*, *The Ghost Garden*, and *As the Wind Blew*.

RIVIERA, *re vya'rah*, the narrow coast line of Italy and France that stretches for 172 miles along the Gulf of Genoa. The eastern half (Riviera di Levante) extends from Spezia to Genoa; the western half (Riviera di Ponente), from Genoa to Nice in France. The beauty and picturesqueness of its scenery and its mild climate lure thousands of tourists to its shores every year. The towns of both countries are linked by famous roads, originally built by the ancient Romans. The foremost towns of the Riviera are Nice, Monaco, Monte Carlo and Mentone, in France; Bordighera, Ospedaletti, San Remo, Rapallo, Levante and Spezia, in Italy.

RIZAL, JOSÉ (1861-1896), a Filipino patriot and writer. Born in province of Laguna, Luzon, of Tagalog parentage, he studied at Manila, and then in Madrid, where he received degrees in medicine and philosophy. He early realized the oppression under which his race labored, and in 1886 published a novel, *Noli Me Tangere*, in which he exposed and denounced the Spanish administration. Sent into exile, he continued his writings in the cause of reform. In 1896 he was arrested, brought to Manila, and after a mock trial was shot, Dec. 30, 1896. His influence was enormous, and he has been ranked as perhaps the ablest man the Malay race has produced.

ROAD RUNNER, a curious bird of the cuckoo family, found in the southwestern



ROAD RUNNER

part of the United States and the northern part of Mexico. Its name refers to its peculiar trick of running swiftly down roads

in front of vehicles or horsemen. It is nearly two feet long, half the length being in the tail, which it can erect at right angles with its body. The body feathers are greenish-brown, each fringed with white. The head is steel-blue. The bird feeds on grains and insects, and builds its nest of sticks on low branches or on the ground. Other names for the bird are *snake killer*, *chaparral cock* and *ground cuckoo*.

ROAD RULES, regulations made for the safe passage of vehicles, in modern times usually decreed by statute or ordinance. In the United States, when two vehicles meet in a highway, both must turn to the right. If one vehicle overtakes another, it must pass to the left of the overtaken vehicle, which must itself turn to the right. Driving at excessive speed renders the driver liable, if accidents occur. At night vehicles must display lights. In the congested cities, these rules are amplified by the addition of many details and are extended to street cars as well as wagons and motor cars.

In England, vehicles meeting turn to the left and the overtaking vehicle bears to the right.

Rules for water travel involve a system of lights, fog signals, steering and sailing, distress and other signals. They were formulated in their present shape as the result of a maritime conference held in Washington in 1889.



ROADS AND STREETS. It has been said that roads and highways are an index to a nation's civilization. At all events, the older the nation, the better are its roads, a statement that can be verified by comparing the roads in Europe with those of the United States or Canada. Previous to the World War all the roads of Western Europe were improved, and a dirt road was an exception. In the

United States and Canada, outside of cities, only a small percentage of the roads have been improved, that is, surfaced with crushed stone, gravel or some other material. The condition of the roads in the United States and Canada is no disgrace to these countries at present, because they include so much

territory and have been settled so rapidly, that it has been impossible for the states and smaller communities to construct roads as fast as they are needed.

In America the terms *road* and *highway* are synonymous; however, the term *highway* is more frequently applied to improved roads connecting important points, while the term *road* is applied to common dirt roads. *U. S. road* and *state road* are terms often used to designate important highways. *Street* formerly meant any paved road, but the name is now restricted to roads in cities and towns. All roads which have been officially designated as such are public, and everyone has the right to travel on them, with the exception of certain city streets, from which the authorities have the right to exclude heavy teaming which may destroy the surface.

Location and Management. Roads are usually located and land for them is set aside when the survey of a new country is made. If this is not done, they are located by state or county authorities, and the land is purchased. In case the owner is not willing to accept the price offered, his land is *condemned*; that is, it is taken for the road, and the price the owner receives for it is fixed by a commission appointed by a court. The owner of the property may give the land, but in order for it to become a highway the land must be accepted by the authorities, who are compelled by law to keep the road in repair. If an owner without protest allows the public to pass over a part of his property for a considerable period of time, the law will consider that he has by implication created a highway and will not permit him to close it.

In most countries, the authority over highways rests with the smallest political divisions, such as the parish in England and the town or county in the United States. However, in the United States the authority originally rested with the state, which has delegated its right to the smaller divisions. Though the public has a right to the use of the highway, it does not own the land over which it passes, but this ownership rests with the owners of the abutting property. This naturally implies a right in the public or in any traveler to the use of the whole highway, and therefore a right to remove an obstruction in any part of it, while it also implies the right of the owners of the abutting property to all the value of the land beneath

the street, that is, to mines or any other thing of value which is found there. Any legislature may establish private highways, giving the persons to whom it grants the road a right to exact toll or taxes from passers-by to pay for its repair.

Good Roads Movement. There is about one mile of road in the United States for every square mile of its land-surface area. Only one mile in ten of these American highways is yet hard-surfaced road. Poor roads are the cause of the greatest loss of profit to a majority of the farmers of the country for the following reasons:

1. **Increased Expense of Hauling.** Careful estimates by the United States Department of Agriculture show that on a muddy earth road, the greatest load a horse can haul in an ordinary wagon is 800 pounds, on a dry earth road it is from 1,000 to 2,000 pounds, on a good gravel road about 3,300 pounds, on a macadam road, from 2,000 to 5,000 pounds; and on an asphalt road from 5,000 to 8,000 pounds. From this we see that on the best road one horse can do the work that it would require five or eight horses to do on a muddy earth road.

2. **Loss of Market.** Many farmers cannot market their crops at the time when prices are highest, because they are unable to move them on account of the condition of the roads. By the time the roads become passable, the season for that commodity has passed, or the market is overstocked and prices are lower.

3. **Value of Land.** One of the important conditions entering into the value of farm lands is access to a good market. Let two farms have the same quality of soil, and be equally distant from a market, one being on an improved road, and the other on a dirt road. The value of the farm on the good road will be considerably greater than that on the other.

Until recently, farmers have generally been opposed to levying taxes for the improvement of highways, but several influences have combined to change their views, and in many states large annual appropriations are now made for the purpose of constructing and improving the highways. The most important agencies in bringing about this movement for good roads are the Office of Public Roads, established in the United States Department of Agriculture in 1893, and reorganized as the Office of Public Roads and Rural Engineering later, and the automobile, which has become a practical necessity.

Previous to 1914, the national government lent its aid chiefly through its "good roads train," or through small appropriations. But

in that year Congress passed a law providing for the annual appropriation of \$25,000,000, to be divided among the states for road improvement, each state government to provide an amount equal to that which it received. Many of the states had already made liberal appropriations for road improvement. The following session of the Congress contracted to spend \$266,750,000 within the next three years for the construction and improvement of roads. Were this appropriation divided equally among the states each state would receive over \$5,500,000 to expend upon its roads. But the conditions of the appropriation were that each state should provide an amount equal to that which it received. Since then every state has accepted Federal aid in the building of hard roads, and more communities are being taken out of the mud every year. The Federal aid extended to the states now aggregates more than \$240,000,000 a year.

Construction and Management. Formerly it was believed that anybody could make a road, and the construction and maintenance of roads was in the hands of those through whose territory the road passed. To-day road-making has become a highly developed branch of engineering. In the construction of a road, the following points should receive careful attention:

(1) **Location of the Road.** It should be run so that it will connect within shortest distances the points between which it extends, provided this can be done without incurring steep grades. In mountainous and hilly countries, most careful engineering is often necessary to locate a road so as to avoid grades that are a great hindrance to the hauling of heavy loads.

(2) **Shaping of the Roadbed.** The earth upon each side is usually plowed and scraped onto the roadbed, where it is given a rounded surface, either by means of a road machine, called a grader, or by hand labor.

(3) **Surfacing.** Earth roads should be covered with gravel or crushed stone. This material should be pressed down onto the road by a heavy steel roller. It protects the surface, allows the hauling of heavy loads and renders the roadbed much more durable; hence, although surfacing is attended with considerable expense, it is economical.

In most localities cement or asphalt is used for surfacing, since they make a smooth, durable road for ordinary travel. They are not quite as durable, however, for roads on which there is much heavy traffic.

With the improvement of roads and modern methods of construction, the management

has passed from the petty officials of a local community to the county and the state, and is placed in the hands of road engineers who, with their assistants, see that the roads under their supervision are kept in repair. They also lay out and supervise the construction of new roads that are authorized

National Roads. The United States government constructs and maintains the roads in the national parks, but, aside from these, it has built but one national road, the Cumberland Road (which see), extending from Cumberland, Md, to Vandah, Ill. The automobile interests and the good roads movement, however, have led to the formation of associations having for their purpose the construction of great national highways, connecting distant parts of the country. The most noted of these projects are the Dixie Highway and the Lincoln Highway, each of which is described under its title. See **PAVEMENT**.

ROANOKE, VA., in Roanoke County, fifty-four miles west of Lynchburg, on the Roanoke River and on the Norfolk & Western and the Virginian railroads. It has a picturesque location near the Blue Ridge Mountains. It is the seat of a large business college and the Memoriet Secretarial School. Hollins College, five miles north, and Roanoke College, nine miles west, are within the greater city's educational advantages. The city also has an academy of music, an auditorium and armory, a Federal building and a city hall. Roanoke was formerly a great tobacco market, but it is now more important as an iron-manufacturing center. It contains rolling mills, car and locomotive works, tobacco factories, bottling works, knitting mills, rayon and overall works, and other factories. The city supports Roanoke Municipal Airport. The city was incorporated in 1884.

Population, 1920, 50,842; in 1930, 69,206, a gain of 36 per cent

ROANOKE RIVER, a river formed in Virginia by the union of the Dan and the Staunton. It flows eastward for a short distance in Virginia, then enters North Carolina and, pursuing a southeasterly course of about 185 miles through a picturesque valley, enters Albermarle Sound. It is navigable for 120 miles.

ROBBERY, a major crime by which there is taken from a person, by violence or intimidation, property of value either on his person or under his protection. Violence and

intimidation are the characteristics which distinguish robbery from other larcenies, and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger of suffering personal violence and might lead a man to part with his property against his will. The punishment is now usually imprisonment for long periods. *Highway robbery*, or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries it is severely punished. See **LARCENY**.

ROB'BIA, DELLA, the name of a famous family of Italian sculptors who flourished in the fourteenth and fifteenth centuries.

Luca Della Robbia (1399-1482), was distinguished for his work in terra cotta, of which by a secret process he made a glazed or enameled variety. He was also distinguished for his work in marble and bronze. His reliefs were found in many churches and other public edifices. The fame of his work spread over Europe, and his madonnas and saints made him the typical religious sculptor of his time.

Andrea Della Robbia (1437-1528), was a nephew of Luca. He is especially famous for his colored reliefs in terra cotta, for Santa Maria delle Grazie, the Cathedral of Arezzo and the loggia of the Hospital of the Innocents, in Florence.

ROBERTS, CHARLES GEORGE DOUGLAS (1860-), a Canadian poet and story writer, was born at Douglas, near Fredericton, New Brunswick, and educated at Fredericton Collegiate School and the University of New Brunswick. He was professor of English and French literature in King's College in 1885-1887, and of economics and international law in 1887-1895. In 1897-98 he was associate editor of the *Illustrated American*, New York. Among his more important writings are *Orion and Other Poems*, *Songs of the Common Day*, *New York Nocturnes*, *The Canadians of Old*, *Around the Camp Fire*, *A History of Canada*, *The Kindred of the Wild*, *Barbara Ladd*, *The Little People of the Sycamore*, *The Backwoodsman*, *Kings in Exile*, *Neighbors Unknown*, *Feet of the Furtive*, *Children of the Wild* and *Hoof and Claw*.

ROBERTS, FREDERICK SLEIGH, EARL ROBERTS OF KANDAHAR, PRETORIA AND WATERFORD, (1832-1914), a British soldier, born at Cawnpore, India, affectionately known

throughout the world as "Bobs." He received his training at the Royal Military College at Sandhurst and the college of the East India Company at Addiscombe, India. For over forty years he was connected with the Indian army, rising to the position of commander-in-chief in 1885. He frequently distinguished himself for personal bravery, for skill in transporting troops and equipment and for brilliant tactics. In 1899 and 1900 he was commander in chief in South Africa. For his services in the South African War he was awarded \$500,000 by Parliament and given supreme command of the British army.

ROBERTS, OWEN JOSEPHUS (1875-), born in Philadelphia and educated at the University of Pennsylvania, began a law career as a district attorney, which was followed by a period as professor of law. Roberts represented the government in prosecuting cases under the Espionage Act after the war and in the Teapot Dome oil scandals; President Hoover appointed him an Associate Justice of the Supreme Court in 1930.

ROBESPIERRE, *roh b spe air'*, **MAXIMILIEN MARIE ISIDORE** (1758-1794), one of the most prominent of the French revolutionists, was born at Arras and educated in the College of Arras and the College of Louis-le-Grand at Paris. He practiced law in Arras with eminent success, and was elected criminal judge. This position, however, he resigned in a short time, because he would not pronounce a death sentence. At this time he was known as a man of integrity, possessed of a kindly nature.

Robespierre held and strongly advocated the liberal democratic views so popular among the French middle classes. In 1789 he was elected deputy to the States-General, or National Convention; from that time he was the leader of the radicals in the convention, and before the close of 1791 he had become the most popular of the revolutionists. In the trial of Louis XVI, he stood strongly and successfully for the death sentence. By the help of Danton and his followers he brought about the downfall of the Girondists and later of the followers of

Hébert, who were carrying the Reign of Terror farther than seemed right to Robespierre. Shortly afterward he caused Danton to be arrested and guillotined.

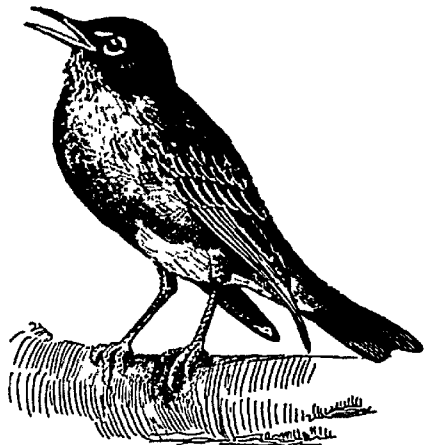
Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height; but although his name more than any other has always been connected with the Reign of Terror, his authority was by no means absolute. Robespierre was a theorist, working toward an ideal state of society, and he felt that the excesses of the Terror were the only means by which that state could be established. His power aroused alarm in the Convention, a party was formed against him and in July, 1794, he was openly accused of despotism. A decree of arrest threw him into Luxembourg prison. Robespierre's followers deserted him, and he was guillotined on July 28, 1794. See FRENCH REVOLUTION.

ROB'IN, or, sentimentally, **ROBIN RED-BREAST**, is the name given to quite different songbirds in Europe and America. In European countries the robin is a small thrush, whose cheerful song is a great favorite and whose friendly ways make it familiar everywhere.

The American robin is a larger bird, measuring about ten inches from beak to tail, whose song is not especially fine, but whose



ROBESPIERRE



AMERICAN ROBIN

sociability and friendliness make it a welcome visitor. Its plumage is very pretty, the orange-red breast being conspicuous against

the olive-gray upper parts, the brownish wings and black head. It builds a strong nest of hay and mud and lays from four to six greenish-blue eggs. Two broods are produced in a year.

Because the robin is the first bird of the year to return from the South, it is recognized as the harbinger of spring. Robins are voracious, considerable of their food consisting of fruit, especially cherries and wild berries. Farmers protect their cultivated cherries and berries from the birds' encroachment by planting wild shrubs near by; but the robin is of service to the farmer also in that its food consists largely of insects and worms. Robins are protected from indiscriminate slaughter in the United States as well as in Canada.

ROBIN HOOD, a celebrated English outlaw, who according to the popular account, inhabited with his followers Sherwood Forest, in Nottinghamshire, and the woodlands of Barnsdale, in the adjoining West Riding. They supported themselves by levying toll on the wealthy, especially on ecclesiastics, and by hunting the deer of the forest. The principal members of his band were his lieutenant, Little John; his chaplain, Friar Tuck; William Scathlock; George-a-Greene, Much, the miller's son, and Maid Marian. The tales of Robin Hood formed the basis for many old ballads, and his adventures served as the foundation of a very successful light opera.

ROBINSON CRUSOE, a celebrated romance by Daniel Defoe, published in 1719. The story is supposed to be founded on the experiences of Alexander Selkirk, who was shipwrecked on Juan Fernandez, an uninhabited island off the coast of Chile, and remained there for years. It is one of the most famous of all adventure stories, and shows what a man, alone with nature and with no tools but his hands, can accomplish. The accounts of the shifts to which Crusoe was forced to resort, his ingenuities and his inventions, are given in Defoe's most realistic style, and this first novel has retained much of its original popularity to the present day. See **JUAN FERNANDEZ**, **SELKIRK**, **ALEXANDER**.

ROB ROY (1671-1734), a celebrated Scotch outlaw, whose exploits are described in Scott's novel *Rob Roy*. His true name was **ROBERT MACGREGOR**, but he assumed his mother's name, Campbell, because the clan Macgregor was outlawed by the Scotch parliament. The name *Roy*, meaning *red*, was

given him because of his red hair and ruddy complexion. He was famous for his skill with the sword, and his great strength. He inherited land in the Highlands and raised cattle for the English market, and found it necessary to keep around him a band of armed men to protect his cattle from thieves. Having engaged unsuccessfully in speculation, he borrowed large sums of the Duke of Montrose, and when he was unable to pay his loan, the duke deprived him of his land. Rendered desperate by his ill fortune and this act of the duke, Rob Roy became an outlaw, and for several years made constant warfare on the duke, carrying off his cattle. By his skill and bravery he foiled all attempts to capture him and for a long time deprived the nobles of their cattle and their rent money. In 1722 he gave himself up to the English authorities, by whom he was imprisoned for a time, then pardoned.

ROB'SON, MOUNT, the highest mountain in British Columbia, is located in the southeastern part of the province, near the boundary between British Columbia and Alberta. Its altitude is 13,068 feet.

ROC, rok, an enormous bird of Arabian mythology, which figures in *The Arabian Nights' Entertainment*. Sindbad the Sailor found a roc's egg that was fifty paces in circumference. When the bird settled down upon it, Sindbad tied himself to one of her legs and was carried away. The roc is purely an imaginary creation.

ROCHAMBEAU, *ro shahN bo'*, **JEAN BAPTISTE DONATIE DE VIMEUR**, Count de (1725-1807), a marshal of France who rendered the American colonies valuable service during the Revolutionary War. He studied for the priesthood, but entered the French army in 1742, fought in the War of the Austrian Succession and distinguished himself in the Seven Years' War. In 1780 he was sent to America with 6,000 men to aid the colonists in the Revolutionary War. Placing himself under the command of Washington, he rendered valuable assistance at the siege of Yorktown. On his return he became governor of Artois and Picardy and subsequently of Alsace; was made a marshal in 1790, and commanded the Army of the North in 1792. During the Reign of Terror he narrowly escaped the guillotine. Napoleon later restored to him his former rank and estates. In 1902, a statue of Rochambeau was unveiled in Washington by President Roosevelt.

ROCHESTER, MINN., the county seat of Olmsted County, about 107 miles southeast of Saint Paul, on the Zumbro River and on the Chicago & North Western and the Chicago Great Western railroads. The city is in a rich agricultural region, where wheat and live stock are the principal products. There are large grain elevators and flour mills. The principal factory products are canned goods, and condensed milk and cream.

The institution for which the city is noted is the Mayo Clinic, of worldwide reputation, and the numerous hospitals which have been located here to provide facilities for patients. The oldest of these is Saint Mary's Hospital. Five hospitals have a total capacity of 1,600 beds. (See MAYO, CHARLES H.) The place was settled in 1854, and the city was chartered four years later. Population, 1930, 20,621.

ROCHESTER, N. Y., the county seat of Monroe County, and the third largest city of the state, ranking below New York City and Buffalo. It is seventy miles east of Buffalo, on the Genesee River and Lake Ontario. The river falls 261 feet in three cataracts within the city limits, which include an area of 34 square miles.

The city is served by the Baltimore & Ohio, Lehigh Valley, Erie, New York Central and Pennsylvania railroads. The New York State Barge Canal is tributary to the city by a branch five miles long. The Genesee River is crossed within the city by several bridges. There is a municipal airport.

Rochester's park system covers 1,777 acres; two of the seven city-owned parks are on the lakeside. The principal buildings are the chamber of commerce, city hall, courthouse, convention hall, two state armories, the post office and 193 churches. The public library has a capacity of 850,000 volumes. The memorial art gallery and the municipal museum are an honor to the city. The Eastman theater is a beautiful structure, operated as a community institution under the direction of the university.

The educational institutions include the University of Rochester with five major departments, Mechanics institute, Saint Bernard Seminary, Colgate-Rochester Divinity School, Nazareth College, and a school for the deaf. There are ten hospitals.

Rochester is an important manufacturing city, and its prosperity is largely dependent upon the water power furnished by the

Genesee River. It has over 1,000 manufacturing establishments. Of the sixteen major industrial classifications listed by the United States Government fifteen are represented here.

Rochester, through her nursery industry and her parks has come to be known as the "Flower City." The annual lilac festival draws thousands of visitors. There are 384 varieties of lilacs in Highland Park—a collection equalled only by that of Kew Gardens in London. It is also known as the "Kodak City" as the largest film, kodak and camera plants in the world are located here.

The city is famous as a musical center. This interest is expressed through the Rochester Civic Music Association, the Philharmonic Orchestra and the Eastman School of Music. Population, 1930, 328,132.

ROCK, in geology the term applied to the solid part of the earth. To the geologist, sand and gravel are rock. A small piece of rock is called a *stone*, and the same term is applied to rock used for building material. The various methods by which rock is formed are described in the article **GEOLOGY**. Rocks are classified, according to their formation, into *igneous*, *stratified* and *metamorphic*. Nearly all known substances are found in the rock envelope of the earth, only a few, however, occur in large quantities. Oxygen and silicon are found in nearly all rocks; aluminum is the basis of clay; calcium is found in limestone, and magnesium occurs in rocks containing magnesia.

Related Articles. Consult the following titles for additional information
 Glacier Metamorphic Rocks
 Igneous Rocks Stratified Rocks

ROCKEFELLER, JOHN DAVISON (1839-), an American capitalist, at one time the richest man in the world, and the chief organizer of the Standard Oil Company. He was born in Tioga County, N. Y., and educated in the public schools of Cleveland, Ohio. At the age of nineteen he entered the commission business on his own account, and two years later engaged in the oil business in Cleveland. In 1870 Rockefeller became president of the Standard Oil Company,



JOHN D.
ROCKEFELLER

which was consolidated with other concerns in 1882, forming the Standard Oil Trust. This was dissolved ten years later.

In 1911 Rockefeller retired from active management of his business interests, and thereafter gave his chief attention to philanthropy. He was the founder of the new University of Chicago, to which he contributed over \$23,000,000. The General Education Board, the Southern Education Board, Harvard and Yale universities, Vassar College, Barnard College and many other institutions have enjoyed the benefits of his liberality. He also generously endowed two great institutions for the alleviation of the sufferings of humanity—the Rockefeller Institute and the Rockefeller Foundation. In 1919 he gave \$50,000,000 to the general education board, and a like sum to Rockefeller Foundation.

During the years when philanthropy engaged a considerable portion of his attention, his gifts aggregated more than \$540,000,000. Fully \$400,000,000 of this enormous sum was bestowed upon four outstanding organizations which his generosity founded—the General Education Board, the Rockefeller Foundation, the Rockefeller Institute for Medical Research, and the Laura Spellman Rockefeller Memorial, the latter a foundation in memory of his wife, incorporated to promote human welfare.

ROCKEFELLER, JOHN DAVISON, JR. (1874–), son of the above, was born in Cleveland. He was educated at Brown University, Providence, R. I., then assumed positions of responsibility in the family activities. Upon his father's retirement, he succeeded to the management of his vast enterprises. He used much of his own fortune in philanthropy and promotion of worthy enterprises. A million dollars was donated by him to the restoration of the palaces of Versailles and Fontainebleau in France, he provided funds for the restoration of Williamsburg, Va., to its colonial appearance. He invested more than \$200,000,000 in the colossal commercial project known as Rockefeller Center (Radio City), in mid-Manhattan.

ROCKEFELLER FOUNDATION, a philanthropic trust founded by John D. Rockefeller, whose original bequest to the enterprise was \$100,000,000. The Foundation was incorporated by the legislature of New York in 1913. The original bequest was made that the "well-being of mankind should be promoted throughout the world." In May, 1917,

another bequest of \$25,000,000 was made, and \$50,000,000 in the latter part of 1919. The Foundation is under the management of a self-perpetuating board of trustees, and the income from the endowment is expended in research work for suppressing disease, in aiding other institutions in prosecuting special lines of research, and in giving direct relief where conditions warrant it.

After the outbreak of the World War great sums were appropriated for relief work in Belgium and for Red Cross work. The expenditures of the Foundation for war work amounted to \$17,042,140, and the total expenditures for the welfare of mankind throughout the world during the period amounted to \$26,509,710. A fund of \$2,000,000 was set aside for building a medical college at the University of Chicago, and over \$2,500,000 has been given the Institute for Medical Research, besides various sums to leading educational institutions, including the American Academy in Rome. Only men of the highest degree of training in their respective fields are employed by the management.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH. This institute was founded in 1901 by John D. Rockefeller, who endowed it with over \$8,000,000. Its object is to further medical research. The property and endowment funds are in the hands of five trustees; the management is entrusted to a board of seven directors. The instructions of the founder were to administer the trust in such a way as to "accomplish the most for humanity and science." A laboratory, hospital and other necessary buildings have been erected in New York, and a corps of experts devote their entire time to research work. A great deal has already been accomplished. Departments of bacteriology, pathology, physiological and pathological chemistry, comparative zoology, pharmacology and experimental therapeutics are maintained. The institute also cooperates with boards of health, medical colleges and other organizations in studying and overcoming disease.

ROCKFORD, ILL., the county seat of Winnebago County, eighty-five miles northwest of Chicago, on the Rock River and on the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & North Western, and the Chicago, Milwaukee, Saint Paul & Pacific railroads. There is an airport. The city is surrounded by an agricultural region, and has a beautiful location on both sides of

the river. Some of the prominent buildings are Memorial Hall, a courthouse, a city hall, two hospitals and a Carnegie Library. The city is the seat of Rockford College, a notable school for women, and it has a parish school and a business college. North of the city is a sanitarium, and in the southern part of the town is another. A dam across the river affords water power for numerous manufacturing establishments. Rockford is sometimes called the "Furniture City," in recognition of its leading product; other manufactures include hosiery, knit goods, agricultural implements, sewing machines, clothing, air-conditioning equipment, textile machinery, meat packing. It was settled in 1834 and was chartered as a city in 1852. Population, 1920, 65,651; in 1930, 85,864, a gain of 30.8 per cent.

ROCK HILL, S. C., in York County, about eighty miles north of Columbia on the Southern Railroad. The city is an educational center, the seat of Winthrop College, for women, and two normal colleges for negroes. There is a Carnegie Library and an airport. It is in an agricultural district in which cotton, alfalfa and fruit are extensively grown. There are cotton mills, a carriage works and manufactories of brick, jute bagging and fertilizer. Population, 1930, 11,322.

ROCK ISLAND, ILL., the county seat of Rock Island County, 180 miles nearly west of Chicago, on the Mississippi River, opposite Davenport, Iowa, on the Hennepin Canal and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul, the Rock Island Southern and the Davenport, Rock Island & North Western railroads. A large United States arsenal and armory is on the island of Rock Island, between the two cities. The island covers about a thousand acres, and the property of the government is worth \$10,000,000. A large combination railroad and wagon bridge constructed by the Chicago, Rock Island & Pacific Railroad and the United States government spans the river from the city to the island and thence to Davenport. Another bridge connects the island with the city of Moline. The river between the island and Davenport is navigable, while the Federal government has constructed a dam on the Rock Island side. This supplies extensive water power for manufacturing, and the principal establishments are plow works, lumber mills, railroad shops,

oil-cloth works, the arsenal and various other factories. Augustana College and Theological Seminary is located here, and the city has Saint Anthony Hospital, a library and a Federal building. The place was settled in 1836, and the city was chartered in 1849. The city is governed on the commission plan. Population, 1920, 35,177, in 1930, 37,953. With Davenport and Moline there is a metropolitan district of more than 100,000 people.

ROCK SALT. See **SALT**, subhead *Rock Salt*.



ROCKY MOUNTAINS, the name commonly applied to that great mountain system extending through North America from Central America nearly to the Arctic Ocean, and forming the "backbone of the continent." In the larger works on geography this mountain system is frequently called the Pacific Cordillera. In the sense in which modern geographers use the name, however, it applies only to

the eastern ranges of this great system north of Mexico. In the latter country the system is known as the *Cordilleras*. The Rocky Mountains of Canada are known as the *Canadian Rockies*.

Divisions and Ranges. In the United States and Canada this great chain of mountains is composed of numerous ranges and groups of ranges, separated from one another by valleys and plateaus. The first great division is made by the Laramie Plateau, a large tract of level land from 7,000 to 8,000 feet in altitude, crossing the southeastern part of Wyoming. It was over this plateau that the first transcontinental railway, the Union Pacific, found a path leading to the Pacific coast.

South of the Laramie Plateau, there is a group of ranges which together are called the Park Mountains, because they surround large tracts of comparatively-level land. The most extensive of these, San Luis Park, extends from Southeastern Colorado into New Mexico, and is 130 miles long and from twenty to forty miles wide. The Rio Grande traverses the entire length, and is fed on the way by numerous mountain streams. However, owing



A ROCKY MOUNTAIN SENTINEL

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Few of the mountain peaks in this vast range possess more sheer beauty than Mount Rainier. Rising to a height of 14,408 feet, it covers more than a hundred square miles

LONGS PEAK AT CLOSE RANGE
dominates Rocky Mountain National Park It is a sheer drop of

to the arid climate and intense heat of summer, the park is barren land. One of the most majestic peaks, Sierra Blanca, with an altitude of over 14,000 feet, rises on the eastern border.

The individual summits as well as the various ranges comprising the Park Mountains are remarkable for their massiveness, their great altitude and their picturesque scenery. Over thirty peaks in this group have altitudes exceeding 14,000 feet, and the portion of this region whose altitude exceeds 10,000 feet is far larger than any other area of similar altitude on the continent. Among the most widely-known summits in the group are Pike's Peak and the Mount of the Holy Cross. The valleys or passes between these ranges are traversed by railways and afford the traveler opportunity to behold some of the grandest scenery in the world. The system attains the greatest breadth in this region, being about 1,000 miles wide on a line running from San Francisco through Denver and Kansas City.

North of the plateau, the Bitter Root, forming a portion of the boundary between Montana and Idaho; the Bighorn, in Western Wyoming; the Tetons, south of Yellowstone Park, and the Wind River Mountains, in Wyoming, are the most important ranges. Fremont's Peak, with an altitude of 13,790 feet, is the highest summit in this group. These ranges extend more nearly north and south, and the park feature is not prominent, with the exception of Yellowstone Park, which is a plateau surrounded by lofty ranges.

Although the summits of the Canadian Rockies are lower than many in the United States, many of the peaks themselves are higher; consequently, the scenery in the Canadian Rockies is more striking and awe-inspiring than in the United States. This is because the summits in the United States rest upon a plateau from 5,000 to 8,000 feet in altitude, while in Canada this plateau has an altitude of only 3,000 to 4,000 feet. Many of the highest summits in the Canadian Rockies have large glaciers, and in this respect resemble the Alps. West of the main ranges are subordinate ranges, including the Selkirks and the Gold Range. Mount Robson, in British Columbia, with an altitude of 13,000 feet, is the highest peak in the group.

General Character of the Mountains. The Rocky Mountains were formed by volcanic

action which threw large quantities of molten rock from the earth's interior, and by folding of the earth's crust. They were formed later than the Appalachian Mountains. Their summits have not been worn down by the action of water, and consequently their general character is rugged. The eastern escarpment is usually higher and more abrupt than the western. In those regions where there is sufficient moisture, the sides are clothed with forests up to the tree line, but in the arid regions they are bare. The entire system is rich in minerals, and valuable deposits of gold, silver, copper and lignite are found in many places. The ores are quite extensively worked, but only a little coal has yet been mined. The ranges comprising the Rocky Mountain system are described under their respective titles.

See CASCADE RANGE; COAST RANGE; SELKIRK MOUNTAINS; SIERRA NEVADA, and other similar titles.

ROCKY MOUNTAINS PARK. See PARKS, NATIONAL

ROCKY MOUNTAIN WHITE GOAT, an animal of the goat-antelope family, inhabiting the higher altitudes of the Rocky Mountains from California to Alaska. It is about three feet high, and in both sexes there are slender black horns curving backward. The small hoofs are also black. It has a long, silky, pure white coat, which enables it to conceal itself in the snow. It is very skilful in climbing and rapid in its movement, so that hunting it is an exciting and not always a successful pastime. It is never found in large flocks, but as the range of any animal is not very great, its paths, or trails, are often clearly beaten into the ground. Its flesh is good to eat, and its hide is valuable for making rugs.

RODENTS, or RODENTIA, *ro den'she a*, an order of mammals represented by mice, rats, gophers, squirrels and a number of other well-known animals. The rodents are gnawers, and their distinguishing characteristic is the possession of large, chisel-like front teeth which enable them to gnaw hard substances. These teeth have a hard enamel on the outside and a softer enamel on the inside, so they have an edge shaped like that on a chisel.

There are more than twenty families and several thousand species in the order. They vary in size from the mouse, the smallest, to the capybara of South America, which is

four feet in length. In general, they are furry, though sometimes they are spiny; they walk flat-footed, and their toes are armed with claw-like nails, or resemble parted hoofs. They live chiefly upon the ground, though a few are tree lovers, and some are aquatic. In the back part of the mouth is a cavity, in which the rodents can store substances that are being gnawed, without taking the chips into the mouth proper. Most of them are active, vigorous animals, and some have become great pests to the human family.

Related Articles. Consult the following titles for additional information

Agouti	Guinea Pig	Pika
Bandicoot	Hamster	Porcupine
Beaver	Hare	Prairie Dog
Chinchilla	Hedgehog	Rabbit
Chipmunk	Jerboa	Rat
Dormouse	Marmot	Squirrel
Flying squirrel	Mouse	Vole
Gopher	Muskrat	Zoology

RODEO, in its original meaning, is a gathering together ("round up") of cattle, or the enclosure of a herd. It has come to be applied to a series of contests in sports in which the contestants display their skill in bronco-riding, steer-roping and other forms of sport developed on the cattle ranches of the West and Southwest plains. It is an outdoor exhibition, customarily given annually, and in Western towns supplanting in popular favor the county fair and carnival.

The first organized cowboy contest was held in Denver, Colo., in 1896. The idea became popular and soon annual rodeos were established in Cheyenne, Wyo., Pendleton, Ore., and Calgary, Alberta. Professional rodeo contestants appear annually in many other places in the cattle country. Valuable trophies and cash prizes are awarded to the victors. The bucking-horse contest offers the highest prize. Definite rules regulate these contests, with penalties for their infraction.

RODIN, *ro daN'*, AUGUSTE (1840-1917), the foremost French sculptor of his century, and one of the greatest of all time, was born in Paris. He introduced an entirely new technique in the handling of marble and subject. His powers developed early, and at twenty-two he executed a very fine study called *Broken Nose*. During the Franco-German War he served in the National Guard and afterwards lived for a time in Brussels. In 1877 he exhibited at Paris his *Age of Bronze*, which, because of its daring realism, created a sensation. This was followed by a bust of Saint John (Metropolitan Museum, New York), *Saint John Preaching* and *The Thinker*, the last probably his best-known work. His

Bourgeois de Calais, a work of intense naturalism and dramatic power, is one of the great achievements of modern sculpture. *Adam and Eve* and the *Bather*, both in the Metropolitan Museum, New York, *The Kiss*, *Francesca da Rimini* and the *Sphinx* are other works of supreme



AUGUSTE RODIN

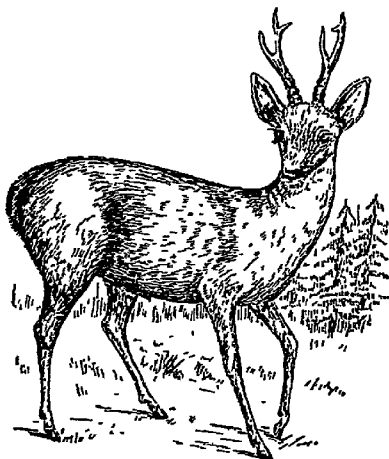
genius. The work of Rodin is not merely that of a master of anatomy and composition; it is the work of a psychologist. The wonderful texture of flesh, the realistic suggestion of muscular strength, are not more remarkable than the intellectual significance of his subjects. He introduced an entirely new method of finishing surfaces—a method which marks one of the chief technical advances in sculpture. Instead of the sleek and shiny finish of the classic school he produced a surface the texture of loaf sugar—extremely beautiful and naturalistic.

ROEBLING, *ro'bling*, JOHN AUGUSTUS (1806-1860), the builder of the Suspension Bridge across the gorge at Niagara, and designer of the Brooklyn Bridge over East River, New York, was born in Muhlhausen, Prussia, and educated in the Polytechnique School at Berlin. He emigrated to America in 1831 and settled in Pittsburgh, was made assistant engineer of slack-water navigation on the Beaver River, and later surveyed the route followed by the Pennsylvania Railroad across the Allegheny Mountains. He then engaged in the manufacture of wire rope, which he used in constructing suspension aqueducts and bridges. Roebling's success in this line of work soon gave him a wide reputation, and when it was decided to construct a bridge across the gorge at Niagara in 1852, he was called upon to direct the work. For years, the Niagara Suspension Bridge was the greatest structure of the kind in the world, and its completion was an epoch-making event in transportation in the United States.

The Brooklyn Bridge was the first suspension bridge across East River, and was a much greater undertaking than the Niagara bridge. The plans for this bridge were all completed under Roebling's supervision, but

he died before the work of construction was begun, and this was carried on under the direction of his son, William A.

ROEBUCK, a European deer of small size, the adult measuring about two feet in



ROEBUCK

height at the shoulders. The antlers, about eight inches long, are small and rough and have two sharp tines. The body is reddish-brown in summer and becomes a pale olive as winter approaches. These animals inhabit mountainous and wooded districts. When irritated or alarmed, they prove very dangerous adversaries and are able to inflict severe wounds with their antlers. They are seen in solitary pairs, which mate for life.

ROENTGEN, *runt'gen*, **RAYs**, or **X-RAYs**, the name given peculiar rays discovered in 1895 by Professor William Roentgen of the University of Wurzburg, while he was experimenting with Crookes tubes. Prof. Roentgen gave them the name X-rays because he did not understand their nature. The name was afterwards changed to *Roentgen rays* in honor of their discoverer.

The apparatus for producing Roentgen rays consists of an irregular globular tube, into each end of which a platinum wire is passed, to serve as a conductor, and from which the air has been exhausted as completely as possible. A concave disk of aluminum is attached to the *negative electrode*, or *cathode*, pole, and a flat disk of platinum to the *positive electrode*, or *anode*. The platinum anode placed at the focus of the alumi-

num cathode and at an angle of 45° to its plane. When the cathode is charged at a high voltage, the impact of the cathode rays upon the anode produces Roentgen rays which pass out through the walls of the bulb. See **CATHODE RAYS**

Roentgen rays are invisible, and can be detected only by their effects. They affect photographic plates much as light does. They also cause some substances, such as certain compounds of calcium, barium, and platinum, to give off light which is easily seen in a darkened room. They pass through many substances such as wood, paper, cloth, and muscular tissues, but do not pass so easily through metals, especially lead, nor bone. If a hand is placed between an X-ray tube and a screen coated with a compound which is rendered luminous by the rays, its shadow appears on the screen. A mere outline of the muscular tissue appears, but the skeleton of the hand is distinctly seen. A ring on the finger makes a still darker shadow. A wooden pencil shows the "lead", but not the wood which covers it. If a photographic film or plate be substituted for the luminous screen, a permanent record is made in the form of a shadowgraph. Roentgen rays owe their penetrating power to very short wave-length.

Uses of Roentgen Rays. Roentgen rays are of the greatest value to physicians for detecting the relations of the parts of broken bones, locating such things as bullets and safety pins inside the body, and studying the action of internal organs. They are used to detect flaws in large pieces of metal and to distinguish precious stones from imitations. By passing X-rays through crystals and reflecting them from crystal surfaces, scientists are able to determine the arrangement of the atoms within the crystals. Roentgen rays should be used with caution, for any tissue is injured by too long an exposure to them.

Wilhelm Konrad Roentgen (1845-1923), the discoverer of the Roentgen rays, was born near Zurich, Switzerland, and educated at Utrecht. He held several important educational positions, previous to 1879, when he was elected professor of physics at the University of Wurzburg, Bavaria. There in 1895 he discovered the rays which gave him a worldwide reputation.

ROGERS, **JOHN** (1829-1904), an American sculptor, born in Salem, Mass. He was educated at Rome and Paris, but returned to the United States where he first gained

prominence by his sculpture *The Slave Auction*. During the Civil War he executed several small groups of war subjects, which became very popular, but he is more widely known by his groups representing scenes in American life. Among his most popular groups are *John Alden and Priscilla*, *The Town Pump*, *Going for the Cows* and *The Charity Patient*. These have been extensively reproduced in bronze, and in casts for schools. The statue of General Reynolds in front of the City Hall, Philadelphia, is one of his most celebrated large works.

ROGERS, RANDOLPH (1825-1892), a famous American sculptor, born at Waterloo, New York. He engaged in business in New York and Ann Arbor, Michigan, and in 1846 he went to Rome, where he studied for four years with Bartolini and other sculptors. Upon his return he acquired a reputation. His statues, *Nydia*, *the Blind Girl of Pompeii* and *Boy and a Dog*, among them, are worthy of high praise. From 1855 until his death he lived in Italy. He designed and modeled the bronze doors of the addition to the Capitol at Washington, built in 1855, and he made the figures of Marshall, Mason and Nelson for the Richmond (Va.) Washington Monument. His most celebrated works are the colossal statue *America* (Providence, R. I.), *Genius of Connecticut* (Hartford), and a figure representing the state of Michigan (Detroit).

ROGERS, WILL (1879-1935), American actor and author, was born in Oolagah, I. T., and received a limited school education. First as an entertainer with a cowboy "rope" and then as a witty monologist, he rose to fame in vaudeville. His humorous comments on life and manners brought him a large audience. From vaudeville, Rogers ventured into radio and motion pictures, in which his quaint humor found full expression. He traveled much by air, and met his death with Wiley Post in a crash in Alaska. Rogers was the author of *What We Laugh At*; *Letters of a Self-Made Diplomat to His President*.

ROLAND, a celebrated hero of the romances of chivalry. According to story, he was a nephew of Charlemagne, in whose army he fought against the Saracens in Spain. He was a brave, unsuspicious, loyal warrior, of simple disposition. According to the *Song of Roland*, an old French epic, he was killed in the Battle of Roncevaux, after a desperate struggle with the Saracens, who had at-

tacked Charlemagne's rear guard. In Italian literature he is known as Orlando. Rolando's celebrated romantic epic *Orlando Innamorato* and Ariosto's *Orlando Furioso* are stories of Roland and his exploits.

ROLAND DE LA PLATIERE, *ro lah'n' de la platyair'*, MARIE or MANON JEANNE PHILIPON, Madame (1754-1793), a Frenchwoman who was very prominent during the early part of the French Revolution. She was precocious from childhood and delighted especially in philosophical and ethical works. She married, in 1780, Jean Marie Roland de la Platière. Shortly after the outbreak of the Revolution, her home became the meeting place for the Girondist leaders, and she was active in support of the Girondists, even after they lost their influence. In June, 1793, she was thrown into prison, and in November of the same year she was executed. Just before her execution she uttered words that have become historic: "O Liberty! what crimes are committed in thy name!" During her imprisonment she wrote memoirs.

ROLFE, JOHN (1585-1622), one of the early English colonists in America, celebrated as the husband of the famous Indian Princess Pocahontas. When Rolfe landed in Virginia, in 1610, he saw Pocahontas at Jamestown, where she was held as a hostage by the deputy-governor for the purpose of bringing her father, the powerful chief Powhatan, to terms. Rolfe married her and took her to England. One son was born to them, and his descendants have figured prominently in Virginia history. John Rolfe is said to have been the first white man to cultivate tobacco. See **POCAHONTAS**.

ROLFE, WILLIAM JAMES (1827-1910), one of the greatest of American authorities on the life and works of Shakespeare, was born in Newburyport, Mass., and was graduated at Amherst College. After completing his college work he became head master of schools at Dorchester, Lawrence, Salem and Cambridge, and from 1904 to 1906 was president of Emerson College of Oratory, Boston. His first Shakespearean work appeared in 1867; among his productions are *Shakespeare the Boy*; *Life of Shakespeare*; *Shakespeare Proverbs*, and *Life of William Shakespeare*.

ROLLER, a strange Old World bird, named for its habit of tumbling in the air while flying and for tossing its food above its head and catching it on its descent.



ROMAN CATHOLIC CHURCH, that body of Christians which accepts the Pope as its visible head. Roman Catholics believe that the Church was established by Jesus Christ and committed to Saint Peter as the chief of the Apostles, to whom he gave the keys of the Kingdom of Heaven. They believe it to be the only Church of Christ, beyond whose pale there is no salvation. The word *pale*, however, according to Roman theology, includes

those of other Christian churches who understand and live in accordance with the precepts and teachings of Christ. The power bestowed by Christ upon Saint Peter is believed by Catholics to descend to his successors to the end of time, and is vested in the Pope as high pontiff of the Church.

Creed and Sacraments. The creed, or belief, of Catholics is defined in the Apostles' Creed, the Nicene, the Athanasian and, most minutely, in that of Pius IV, after the proclamation of the Council of Trent in 1562. The Church has seven sacraments, which are believed to impart spiritual grace, three of which can be taken advantage of but once namely, baptism, confirmation, and holy orders. The ceremonial of the mass is regarded as the most sacred and solemn in the ritual of the Church. In it Catholics believe that the body, blood, soul and divinity of Jesus Christ are really present in the bread and wine, and that this form of worship was ordained by Christ at his Last Supper with his Apostles and has continued to the present time.

Further Beliefs and Ceremonies. Catholics believe that Mary, the mother of Christ, can obtain for them innumerable spiritual benefits, if they appeal to her. They believe that in her conception she was immaculate. Notwithstanding the fact that divine worship is denied to her, she is honored beyond any of the other saints. Her invocation and that of the other saints is prescribed in the Creed of Pius IV, which also imposes reverence for images of them, such as statues or pictures. After the Virgin Mary, Saint Joseph is the most honored of all the saints.

A place of purification after death, known as purgatory, is also believed in by members of the Roman Church. Those dying penitent, but not wholly cleansed from sin, make full atonement in purgatory, after which they are admitted into heaven.

The Pope. The definition of the Church, as understood by Catholics, is a congregation of all the faithful under the supremacy of the Pope, who has been pronounced infallible. His infallibility, however, is limited to questions of doctrine and faith, which have been or would be defined by councils of the Church, composed of cardinals and other ecclesiastical hierarchs.

Priesthood. All entering the priesthood must assume the vow of celibacy before admission to holy orders, according to the law of the Western Church. There is, however, no apostolic obligation on the Church to impose celibacy as an indispensable qualification for the priesthood, but it is regarded as an important quality, since those in a married state would not give their attention wholly to spiritual duties. Gregory the Great and the Council of Toledo in 653 prohibited marriage by those in holy orders. Persons in minor orders, though married, were for centuries allowed to serve the Church. In the twelfth century minor priests at marriage were deprived of clerical privileges. Boniface VIII, in 1300, permitted them to act as clerks, provided they had the sanction of the bishop. The Council of Trent subsequently pronounced such marriages null and void. In the East, clerical celibacy existed in Thessaly, Achaia and Macedonia in the fifth century. When Synesius in 410 was elected bishop of Rome, he accepted the office only on the condition that he be allowed to live with his wife. The consequences of various laws on the question are that Greeks who aspire to the priesthood leave the seminaries and return for ordination after marriage, that secular priests can live in the married state, but on the death of a wife cannot take a second, and that bishops are chosen from the monks. All monks and nuns must be celibates.

Related Articles: Consult the following titles for additional information:

GENERAL

Abbot
Absolution
Antipope
Archbishop
Ave Maria
Benedictines
Bishop
Brethren
Bull

Canon Law
Canonization
Capuchins
Cardinal
Carthusians
Censer
Charity Sisters of
Conclave
Concordat

Counter-Reformation	Mendicant Orders
Dominicans	Mercy, Sisters of
Eucharist	Missal
Franciscans	Monasticism
Hermits	Monk
Hierarchy	Nun
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Holy Water	Paulists
Holy Week	Penance
Index Expurgatorius	Pope
Indulgence	Priest
Innocents, Feast of	Purgatory
Holy	Rosary
Jesuits	Sacrament
Litany	Sacred College
Liturgy	Uction
Magnificat	Ursulines
Mass	Vatican Council

BIOGRAPHY

Ambrose, Saint	Manning, Henry
Aquinas, Saint Thomas	Edward
Augustine, Saint	Mercier, Honoré
Barbara, Saint	Merry del Val, Rafael
Becket, Thomas à	Mundelein, George W.
Begin, Louis Nazaire	Newman, John Henry
Bernard, Saint	Nicholas, Saint
Boniface, Saint	O'Connell, William H
Cecilia, Saint	Patrick, Saint
Falconio, Diomedé	Ryan, Abram Joseph
Farley, John Murphy	Sebastian, Saint
Francis of Assisi	Tertullian
George, Saint	Theresa, Saint
Gibbons, James	Thomas à Kempis
Ignatius, Saint	Valentine, Saint
Ireland, John	Veronica, Saint
Lanfranc	Xavier, Francisco
Loyola, Saint Ignatius	

ROMANCE, *ro mans'*, a fictitious narrative in prose or verse, the interest of which turns either upon marvelous or uncommon incidents. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated—the French, Italian and Spanish, called the *Romanse languages*.

The ancient Greeks manifested great love for stories of adventure, which were the fore-runners of the modern romance. The most representative of these are the *Iliad* and the *Odyssey*. The earlier mediæval romances of Western Europe were metrical and may be divided into two classes: the popular epics, chanted by strolling minstrels, and the more elaborate and artificial poems, composed and sung by the court poets. Both classes were based on more ancient lays, treating of celebrated heroes, frequently mingled with pagan myths and with connecting passages composed by the reciters. Thus originated a series of epics, grouped around some renowned hero and forming a cycle of romance.

The romances of French origin form a large and interesting body of literature, some attaining a length greater than 20,000 lines. These romances were sung by wandering minstrels to the sound of a kind of violin. Many of the reciters wrote their own chansons, others bought copies from the original composers. The romances of the Arthurian cycle owe

their origin to the lays of the Welsh bards, supposed to be as old as the sixth and seventh centuries, but they are directly based on the Latin *History* of Geoffrey of Monmouth, which was versified in French by Wace (1155–1158) and was amplified and translated into English by Layamon, about 1204. The Arthurian romance spread from France to Provence, Spain, Italy and the Netherlands, and was again transplanted into England. It is through Malory's *Morte d'Arthur* (1485), a prose version of the tales, that it came down to later times.

The favorite heroes of romance, besides Arthur, were Charlemagne, Roland, Alexander, Richard Lion-Heart and Guy of Warwick. In addition to romances dealing with these, we find also a class in which exploits of Teutonic heroes are celebrated, as the Anglo-Saxon or Anglo-Danish *Beowulf*, the old German *Nibelungenlied* and the romance of *Havelok the Dane*. The poetical romance was superseded by the prose romance, the transformation of metrical into prose romances being due in part to the invention of the art of printing, by which the necessity of meter for purpose of recital was done away with. The prose narratives, which, like those in verse, celebrated Arthur, Charlemagne, Amadis de Gaul and other heroes of chivalry, had a definite part in the development of the novel. See NOVEL.

ROMANCE LANGUAGES, the languages of Southern Europe which owe their origin to Latin. These languages were not based on literary Latin, such as is found in the classics, but on the everyday speech of the Romans; for it was the soldiers, tradesmen and artisans who carried the Roman language into the conquered territories of Rome. This Latin was much modified wherever it was introduced, and in time a new tongue grew up in each case where the Romans had grafted their language on native speech. The Romance languages are the French, Spanish, and Italian.

ROMAN LAW. See CIVIL LAW.

ROMAN NUMERALS, the number symbols used for numbering the dials of clocks, the volumes in a set of books, the pages of prefaces and for various other purposes, are the symbols which were employed by the Romans in their arithmetical computations. The system is very simple, but it has for centuries been replaced by the Arabic, which is more convenient to write (see ARITHMETIC).

The system doubtless originated from counting on the fingers, as *I* for one, *II* for two, *III* for three, *IIII* for four. Then it became customary to write five with four vertical lines and a slant line across them. Probably from this device the use of *V* for five was evolved. Two *V*'s placed point to point form *X* the symbol for ten. *C*, the initial for *centum*, meaning *hundred*, stands for 100, *M*, the initial for *mille* one thousand, is the symbol for that number. *L* is the symbol for fifty and *D* for 500. The method of writing is simplified by subtraction. Instead of writing *IIII* for four, it is expressed by *IV*, the small number before the larger indicating that it is to be subtracted; thus we have *XL* for forty and *MCM* for 1900.

ROMANOFF, *ro'man awf*, the name of the family that ruled Russia from 1613 to 1917. Feodorovitch Romanoff, of the royal house of Rurik, was chosen by the half-barbarous nobles of Russia ruler of the country in 1613, and was given the title of *czar*. Nineteen Romanoffs in succession continued to rule Russia, until the last, Nicholas II, was deposed in 1917. Only two of this number won distinction by their statesmanship; these were Peter the Great, who found Russia almost disorganized and developed it into a strong nation, and Catherine the Great, who made her country respected in the courts of other nations.

The other rulers pursued a narrow policy that shut Russia from the rest of the world. Under them Russia was ruled by autocratic officials who oppressed the people and stamped out with utmost cruelty any attempt on part of the common people to have a voice in the government. Their influence was so strong that no legislative body was tolerated until early in the twentieth century, and then for several years it was not permitted to exercise any power. But the people were gradually gaining political strength, and finally, exasperated over conditions brought about by the World War, on March 15, 1917, the Duma, or Russian national legislative assembly, compelled Czar Nicholas II to abdicate. He named his brother Michael his successor, but the latter refused to assume the responsibility unless it was the people's will, and the rule of the Romanoffs came to an end.

The members of the Imperial family were imprisoned in the Tsarkoe-Selo Palace. Later they were removed by the Bolshevik government to Tobolsk, Siberia, then to Ekaterin-

burg, where the ex-czar was executed by order of the Bolsheviks, on June 16, 1918. See NICHOLAS II.

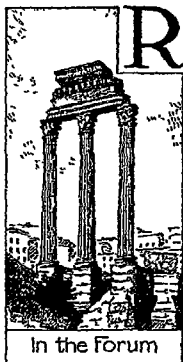
ROMANS, *EPISTLE TO THE*, the most elaborate and important letter of Paul the Apostle. It was written at Corinth, A. D. 57 or 58, and expressed Paul's desire to visit Rome. The burden of the letter was the Apostle's doctrine of justification by faith, through which he showed how the Christian dispensation was extended alike to Jews and Gentiles. This doctrine was accepted by Luther as the foundation of his system, and it is one of the most important articles in the creeds of Protestant Churches.

ROMANTICISM, *ro man'tisizm*, in the literature of Western Europe, the name given a movement having for its purpose the rise and development of imagination and sensibility in both the prose and poetry. Romanticism indicated the tendency of nineteenth-century authors to free literature from the Greek and Roman formalism which had for many years considered form of greater importance than thought and sentiment. At the beginning of the movement Pope was considered the greatest English poet, because of the correctness of his verse. James Thompson in 1727-1730 published his *Seasons*, in which for the first time attention was given to nature. This poem may be considered as the first to attract attention to the new movement.

Gray's *Elegy*, Goldsmith's *Deserted Village* and Cowper's *Task* gave impetus to the movement, which later reached its height in Scott, Byron, Shelley, Keats, Wordsworth, Coleridge and Burns. In Germany the leaders in the opposition to classic ideals in literature were Lessing and Herder; Goethe's *Sorrows of Werther* is one of the extreme products of the movement. But the name *Romantic School* is usually given in Germany to the group of which the chief members were the brothers Schlegel, Novalis, Tieck, Schelling and Schleiermacher. Victor Hugo, by the publication of his *Odes and Ballads*, in 1826, and of his *Cromwell*, shortly afterward became the leader of the romantic movement in France.

ROMAN WALLS, walls constructed by the Romans, on the northern boundary of Britain, to protect the country from incursions of the Picts and Scots. The Wall of Hadrian, built A. D. 120, extended between the Tyne and the Solway. The wall was strengthened

by Severus, and is often called the Wall of Severus. The Wall of Antoninus, built in 139, extended between the Forth and the Clyde rivers. It marked the northern boundary of Roman dominion. Portions of these walls are still in a good state of preservation.



ROME, the capital of the modern kingdom of Italy, a city possessing glorious traditions and a history reaching far back into antiquity. Over seven centuries before Christ, so the story goes, a settlement was made on one of seven hills extending along the left bank of the Tiber River, about fifteen miles from the sea. In course of time the neighboring elevations were peopled, and eventually the settlements united to form the Rome of history, a city great and powerful, ruling the world from its seven hills. The Rome of to-day is a religious center of the Western Christendom and the residence of the Pope, and in many respects it is like other modern cities. Yet its wonderful ruins, a priceless heritage from the past, are ever there to suggest the city of the ancient republic and the world empire.

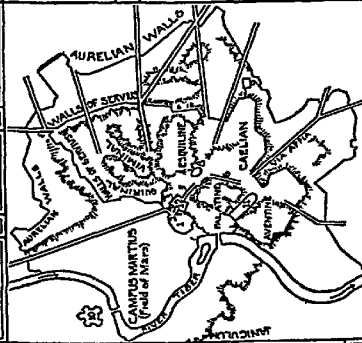
Ancient Rome. During the many hundred years of Rome's existence its appearance and condition changed repeatedly, but it is best known as it appeared during the reign of Emperor Augustus, when it was at the height of its splendor. Of this ruler it was said that he "found a city of wood and left one of marble." The streets were crooked and narrow, but splendid public buildings, such as temples, porticoes, theaters and baths, gave parts of it an appearance of wonderful beauty. At that time the population is supposed to have been more than a million, and in the time of Trajan it was not far short of two million.

Ancient Rome was surrounded by high walls, the Tiber was spanned by eight or nine bridges, and within the walls were open places, or parks, covered with grass and trees. Several paved spaces, surrounded by imposing buildings, were the places of public meeting, and of such the *Forum Romanorum*, which lay between the Capitoline and

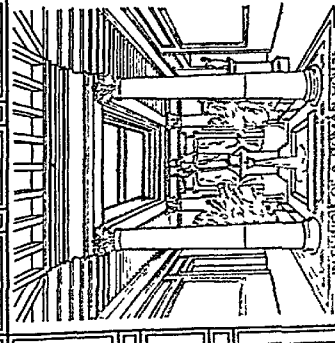
Palatine hills, was chief, although the Forum of Trajan was more splendid. The central street of the city was the *Via Sacra*, or Sacred Way, which, beginning at the base of the Capitoline Hill, ran along the Forum by the Colosseum and to the space between the Esquiline and Caelian hills. The two principal roads leading out of Rome were the Flaminian Way, or Great North Road and the Appian Way, or Great South Road. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods, was a great circular building with a dome roof, 140 feet wide and 140 feet high. It was a marvel of construction, and so well was the work done that the Pantheon is still in excellent preservation.

Other temples built at various times were the white marble Temple of Apollo, on the Palatine; the Temple of Minerva, which Pompey built and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful in Rome; the Temple of the Sun, and the magnificent Temple of Venus, which Caesar caused to be built to her. The principal imperial palaces were on the Palatine Hill. The most magnificent of the amphitheaters was that of Titus, completed in A. D. 80, and now known as the Colosseum. The Circus Maximus, between the Palatine and the Aventine, and the theaters of Pompey and Marcellus, were all celebrated for their size and elegance. The public baths of Rome were numerous, and some of them were enormous buildings, splendidly decorated and furnished. Extensive ruins of the baths of Caracalla and of Diocletian still remain and testify to the luxury with which the pleasure-loving Romans surrounded themselves.

Rome was decorated with triumphal arches and beautiful columns, built at various times. In the corner of the Forum may still be seen the great Arch of Septimius Severus; at the other end is the beautiful Arch of Titus, and nearer the Colosseum is the well-preserved Arch of Constantine. Trajan's beautiful pillar, 117 feet high, still stands among the ruins of his Forum. A spiral panel, running from top to bottom, shows in relief the triumphs of Trajan, and furnishes to modern scholars the best illustrations of the costumes and habits of the epoch. Within, a flight of stairs gives access to the top of the pillar. Magnificent tombs were located here



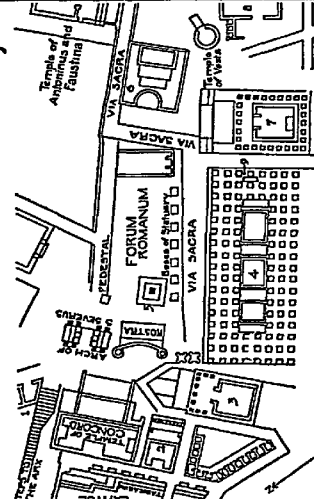
- PLAN OF ANCIENT ROME**
- 1 Capitoline Hill
 - 2 Palaces of the Caesars
 - 3 Colosseum
 - 4 Circus
 - 5 Circus Maximus
 - 6 Via Triumphalis
 - 7 Forum
 - 8 Circus
 - 9 Circus
 - 10 Circus
 - 11 Circus
 - 12 Circus



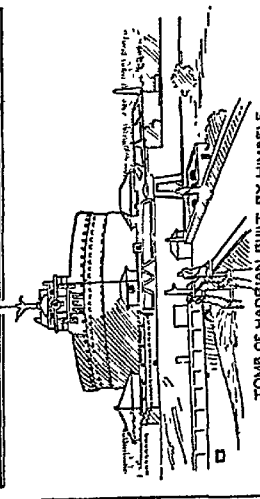
INTERIOR OF A ROMAN HOUSE

ROME

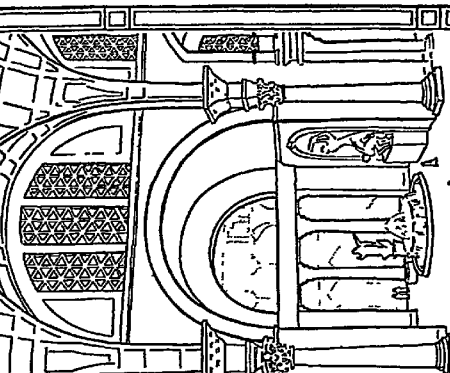
The Eternal City



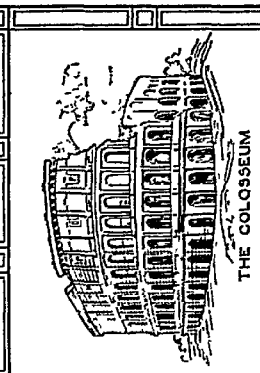
- PLAN OF THE ROMAN FORUM AND THE SURROUNDING BUILDINGS**
- 1 Temple of Vesta
 - 2 Temple of Saturn
 - 3 Temple of Mars
 - 4 Temple of Jupiter
 - 5 Temple of Venus
 - 6 Temple of Minerva
 - 7 Temple of Castor and Pollux
 - 8 Temple of the Vestals
 - 9 Cloaca Maxima



TOMB OF HADRIAN, BUILT BY HIMSELF



BATHS OF CARACALLA
A most magnificent building
accommodated 1600 bathers.



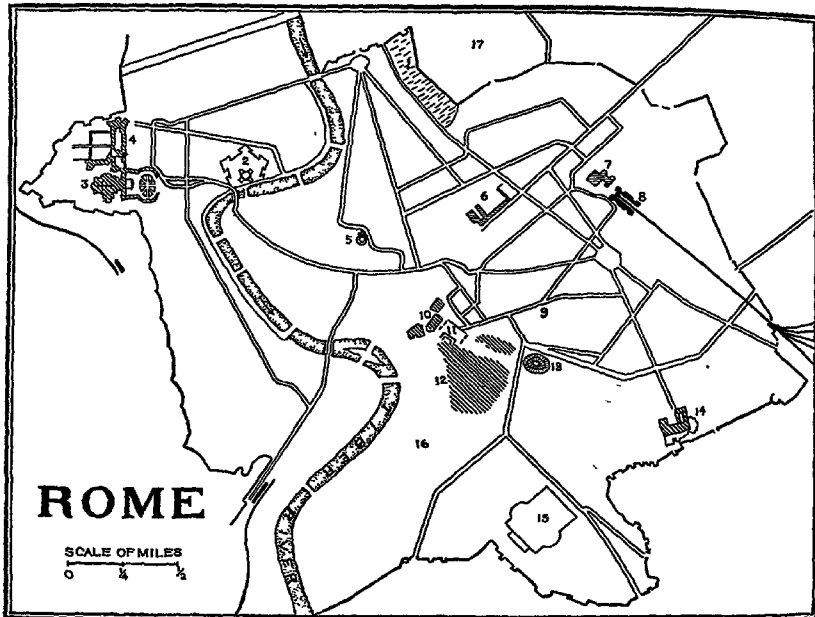
THE COLOSSEUM

and there throughout the city, chief among which were the Mausoleum of Augustus and the noble tomb of Hadrian, still standing on the west bank of the river and known as the Castle of Saint Angelo. Only passing mention can be made of the rich private dwellings of the nobility, crowded with treasures of art, which ornamented the more favored parts of the city.

Modern Rome. Since Rome became the capital of modern Italy it has been improved

stone embankments keep the treacherous stream within its banks and prevent the lower parts of the city from being flooded, as they were in former times.

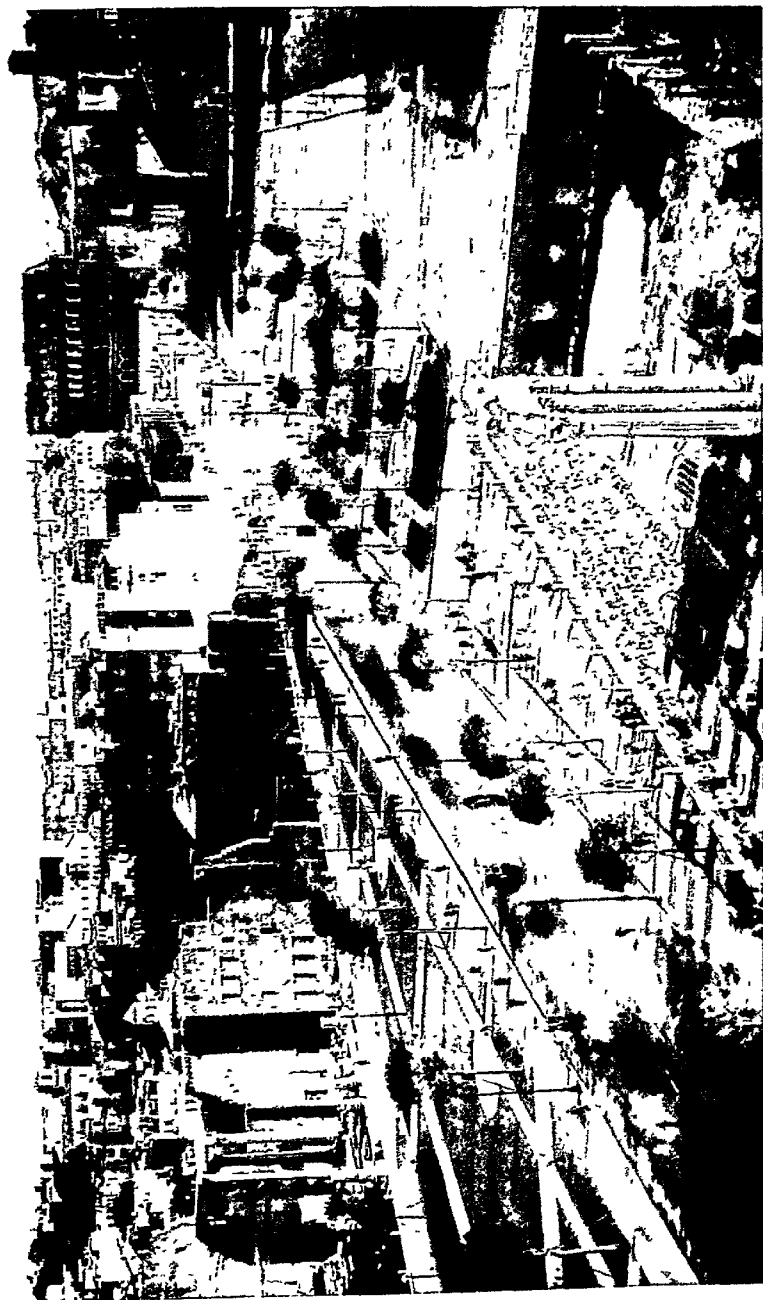
Among the principal squares of modern Rome is the Piazza del Popolo, on the north side of the city, near the Tiber, from which the three principal streets of the city diverge. Another street crossing the river leads to the Vatican and the Church of Saint Peter's, which occupy conspicuous positions on the



1, Pincian Hill; 2, Hadrian's Tomb; 3, Saint Peter's; 4, Vatican; 5, Pantheon; 6, Quirinal (Royal Palace); 7, Baths of Diocletian; 8, Railway Terminal; 9, Column of Trajan; 10, Capitol; 11, Forum; 12, Palatine Hill; 13, Colosseum; 14, Lateran; 15, Baths of Caracalla; 16, Aventine; 17, Villa Borghese

in cleanliness and general healthfulness; it has been given excellent systems of electric railways, wide new streets and whole sections of fine modern buildings, so that it is an attractive city, aside from its historical associations. The city is surrounded by a wall and is entered by twelve gates and several openings through which railways pass. The wall on the east bank occupies the lines laid down by Aurelian in the third century, but the west wall was not built until the seventeenth century. There are ten fine bridges across the Tiber within the city, and great

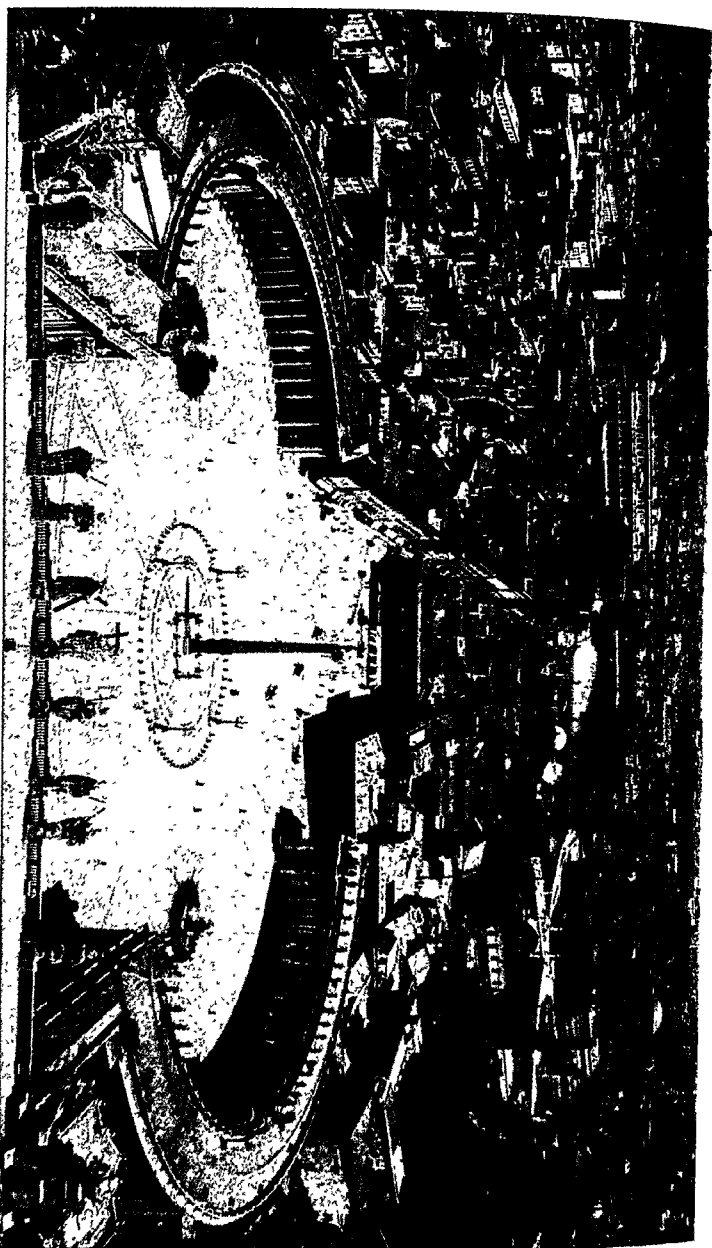
hills. The Quirinal, or the king's palace, is situated on an eminence near the center of the city. The Capitoline Hill is still crowned by the Capitol and two large museums on the sides of a little central court, in which is the equestrian statue of Marcus Aurelius. The appearance of the hill, however, has been much changed of late by the erection of a great monument to Victor Emmanuel. The Palatine Hill is a mass of ruins which, with the territory immediately surrounding it, is still the subject of continued excavations, which are from time to time revealing re-



1 wing (allow 3)

BUILDING A NEW IMPERIAL ROME

The "Road of the Empire," from the Colosseum through the center of the city to the Piazza Venezia, is an important step in making Rome the capital of a new Roman Empire [See over]



MODERN ROME

Looking from the dome of St. Peters we see the two arcs of the great colonade. To the left and end of the colonade is the entrance to the Vatican. In the distance are seen the Castle of Sant' Angelo and the Tiber.

[See over.]

markable remains of ancient Roman splendor. The Forum has been excavated and contains many fragments that show the beauty of its statuary and other decorations. Rome is filled with beautiful churches, of which the greatest are the Church of Saint Peter's and the Cathedral of Saint John in Lateran, the latter in an isolated locality near the south wall of the city. There are beautiful parks and fine drives through the city, especially on the Janiculum, a hill extending along the west bank of the river. The Pincian Hill, near the Piazza del Popolo, is laid out with gardens and beautiful drives. A wide, new boulevard now crosses the city.

Outside the walls near by are the Borghese gardens and the palace, celebrated for its picture gallery. Other private palaces within the city contain fine collections of paintings, most of which have been secured by the Italian government. Public museums and picture galleries are numerous, and in them are guarded the treasures of art from early times to the present. Among them the Vatican may be considered the greatest, with its unrivaled collections of statuary and paintings, but the Capitoline Museum contains some of the most famous statuary of the world.

Educational institutions abound, among which the University of Rome ranks first. The *Collegio Romano*, formerly a Jesuit college; the *Collegio de Propaganda Fide*, an establishment where Roman Catholic missionaries are trained; the American School of Classic Languages, and several other institutions for training in art, science and literature register numerous students. There are several great libraries, modern theaters, hospitals and other public and charitable institutions, such as are found in most cities, though all are more or less affected by the historic importance of the city and the fact that it is the center of interest for travelers the world over. This affects also the trade of the city, which is externally unimportant, as the river can be navigated only by small craft, while railway facilities are limited. However, woolen and silk goods, artificial flowers, jewelry, earthenware and objects of art are manufactured, and trade in these is considerable.

From the downfall of the Roman Empire, the history of Rome is included in that of the Papacy. In 1527 the city was captured and sacked by the troops of the Constable of

Bourbon; in 1798 it was occupied by the French; in 1848 Pius IX was driven from Rome and a Roman republic was formed, under Mazzini and Garibaldi. A French army sent to the Pope's assistance captured Rome in July, 1849, and under the protection of the French, the Pope ruled until October, 1870, when Rome was occupied by the Italian troops. In June, 1871, the "Eternal City" became the capital of United Italy, and the king took up his residence in the Quirinal Palace. Population, 1934, 1,121,189.

Related Articles. For description of important structures of ancient and modern Rome consult the following titles:

Applan Way	Pantheon
Arch	Papal States
Campus Martius	Saint Peter's Church
Capitol	Septimius Severus
Caracalla, subhead	Titus, subhead Arch
Baths of Caracalla	Trajan, subheads Arch
Circus	Column
Colosseum	Vatican
Forum	Vatican City
Lateran	



Arch of Titus

ROME, HISTORY OF. The origin of Rome is connected in legend with the Trojan War, through Aeneas, who was led by the will of the gods to Italy. His son Ascanius founded Alba Longa, which placed itself at the head of the league of Latin cities. About 400 years after the founding of the city, Romulus and Remus, the grandsons of Numitor, king of Alba Longa, founded a new city on the Palatine, one of the seven hills on the left bank of the Tiber (753 B. C.). In a quarrel over the name and government of the city, Remus was slain by his brother, who became the first king of Rome. To hasten the growth of his new city, Romulus made it a place of refuge, to which he invited the lawless and discontented from the surrounding country. As neighboring tribes refused to allow their women to marry the Romans, Romulus secured wives for them by the so-called *rape of the Sabines*. The war with the Sabines, to which this led, was ended by the intercession of the women, and the Romans and Sabines united to form a single nation.

Period of the Kings. In prehistoric Italy there were numerous tribes, the most important of which were the Latins. Rome subdued the less important cities of Latium one after

another, and the inhabitants moved to Rome, where they formed the plebeian class, which was without political rights. At the head of the government of Rome was the king, who was elected by the people, and next to him was the Senate, composed of three hundred members. A popular assembly, which included the heads of all the families, had the right to make laws, decide upon peace and war and confirm the election of the king. Tradition gives as the names of the kings of Rome who succeeded Romulus; Numa Pompilius, Tullus Hostilius, Ancus Martius, Tarquinius Priscus, Servius Tullius and Tarquinius Superbus, the last of whom reigned until 509 B. C. The period of the kings was occupied largely with contests between the patricians and plebeians, as a result of which the latter gained certain privileges. The last king, Tarquinius Superbus, by his acts of oppression so angered the people that they rose against him and drove him from the state, declaring that henceforth the supreme power should be held by no one for life. Rome was declared a republic, and at the head of the new government were placed two magistrates, called consuls, chosen for one year and possessing powers which were almost identical with those of the early kings.

Republic Formed. The first two or three hundred years of the Republic were marked by bitter contests between the patricians and plebeians. The first step toward equality and protection for the plebeians against the patricians was the creation in 494 of the office of tribune, which the plebeians secured by withdrawing from the city and refusing to return until concessions were granted. Another demand which the plebeians made was that the laws, which hitherto had not been written down, should be codified and put in such a form that any one might acquaint himself with them. The result of this was the appointment of the decemvirs and the preparation of the Law of the Twelve Tables, upon which all subsequent Roman jurisprudence was based. A law legalizing intermarriage between the plebeians and patricians equalized the two orders socially, and the demand of the lower class for admission to the consulship resulted in a compromise—the election of military tribunes, with consular power, who might be from either order. Of the questors, who were first elected in 447, it was provided that two might be plebeians, and in 367 the *Licinian Law* not

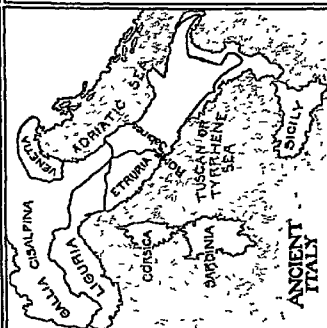
only admitted plebeians to the consulship, but declared that one of the consuls must be a plebeian. To offset this advantage, the patricians secured the new office of praetor, but the praetorship also was soon opened to the plebeians.

Early Wars. Externally this period was marked by numerous wars. The neighboring tribes, which had made treaties with the king of Rome, regarded their allegiance as ended by his expulsion, and certain Etruscan tribes, with Lars Porsena of Clusium at their head, aided Tarquin in his vain attempts to recover his throne. Chief of the wars in which Rome engaged against the neighboring tribes were those against the Veientes, the Volscians and the Aequians. In 390 B. C. the Gauls under Brennus invaded Roman territory from Northern Italy and captured Rome, which they plundered and burned, but failed to take the citadel, which was heroically defended by Manlius for seven months.

In its progress southward, Rome came into collision with the Samnites, and a contest for the mastery of Italy began which lasted for over fifty years (343–290), with occasional interruptions. In spite of some defeats, the Romans were ultimately successful, and firmly established their supremacy over the Samnites. Rome's progress in the East was opposed by the Tarentines, who called to their aid Pyrrhus, king of Epirus. Pyrrhus was in the end defeated and compelled to leave Italy, and the supremacy of Rome in Southern Italy was secured.

The Punic Wars. Rome next came into collision with Carthage, the most powerful foe thus far encountered. The two peoples had had a treaty of alliance since 348, but it was of little significance, and the jealousy with which each viewed the progress of the other grew, until in 264 B. C., on a slight pretext, war was declared. Between the close of the first Punic War (241) and the outbreak of the second (218), both Rome and Carthage were busy strengthening their resources. The final result, however, was the same as that of the first war, and Carthage lost to Rome all its colonies and was obliged to pay a large annual tribute.

Conquest of Greece and Spain. Rome's next wars of conquest were in the East. The first Macedonian War (214–205) accomplished little, as Rome was at the time engaged in the struggle with Carthage, but the second ended with the complete defeat at



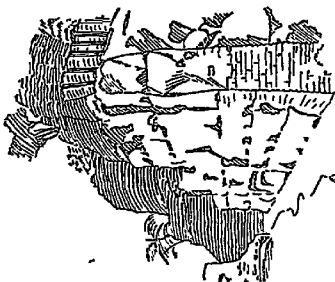
ANCIENT ITALY

ROME

The Legendary Period

753-509 B.C.

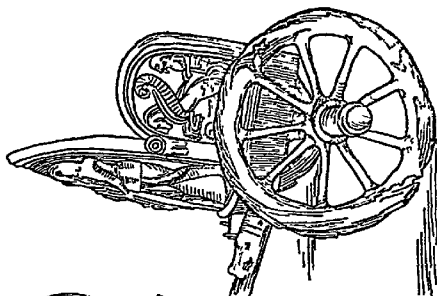
CHRONOLOGICAL SUMMARY	
Founding of Rome, about . . .	753
Numa Pompilius	716
Tullus Hostilius	672
Anous Martius	640
Lucius Tarquinius	616
Servius Tullius	578
Tarquinius Superbus	534
Expulsion of the Kings . . .	509



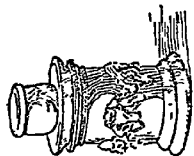
PART OF THE WALL OF ROME
SAID TO HAVE BEEN BUILT BY ROMULUS



COIN
SHOWING PROW
OF SHIP



ROMAN CHARIOT OF THE
SEVENTH CENTURY B C



ROMAN DOMESTIC ALTAR



A VESTAL VIRGIN



THE TARPEIAN ROCK
(FROM AN OLD PRINT)

Cynosephalae, in 197 B. C., of Philip V of Macedon. In 172 the Greeks united under Perseus, the new king of Macedonia, and the third Macedonian War followed, which was ended by the decisive victory of the Romans at Pydna (168). Twenty years later the Achaean League attempted a revolt, and Roman armies promptly marched into Greece, put down the rising and converted Greece into a Roman province (146 B. C.). This same year marks the close of the third Punic War (149-146), which consisted merely in the siege and heroic defense of Carthage. The splendid city was destroyed, and Africa became a Roman province. In Spain an obstinate war had been carried on by the Celtiberians, but the country was finally subdued in 133.

Decline of the Republic. The last century of the Roman Republic was marked by incessant civil dissensions. In spite of the nominal equality in the civil and political rights of the two orders, the government was exclusively in the hands of the nobility, and the Senate ruled with almost sovereign power. Attempts were made to better the condition of the plebeians, but little was accomplished. From the death of the younger Gracchus, in 121, a corrupt aristocratic government ruled. The honor of the Roman state had sunk so low that when Jugurtha, king of Numidia, revolted and usurped the neighboring territory, which was under the Roman protectorate, the commissioners sent to investigate and the army dispatched to subdue him were readily won over to his side by bribes. At length, however, the war against Jugurtha was taken up and brought to a successful close by Caius Marius (106).

Rome was now threatened from the north by two Germanic nations, the Cimbri and the Teutones, and this danger also Marius averted. In 91 B. C. began a fierce struggle known as the Social War, in which the Latins and the various Italian peoples contended for the rights of Roman citizenship, which belonged only to the inhabitants of the capital and of Roman colonies. Although generally victorious, Rome wisely ended the strife by granting the privileges demanded. In this Social War, Marius and Sulla fought side by side, but jealousy between them was constantly growing, and when, in 88, Sulla was chosen as a leader in the war against Mithridates, king of Pontus, the result was civil war. The war with Mithridates was a long

and stubborn contest, but it was finally brought to a close in 65 B. C. by the defeat of Mithridates by Pompey. The Catiline conspiracy, which broke out in Rome in 63 B. C., was put down only by the vigilance and genius of Cicero.

For the next twenty years, the history of Rome is the biography of the men who in 60 B. C. formed the famous first triumvirate—Caesar, Pompey and Crassus. After the death of Caesar, his assassins did not receive the public approval which they had expected, and the chief power of the state fell into the hands of Mark Antony. After several years of struggle, a second triumvirate was formed, consisting of Octavius, Antony and Lepidus. When his rivals were removed, Octavius, with the added name Augustus, was able to establish under republican forms an absolute and perfect monarchy. In 29 B. C. he received the supreme power for life.

The Empire. During the first 200 years of the Empire, the forms of constitutional government were generally observed. The oppression of occasional tyrants, as Tiberius and Nero, affected chiefly the capital, the provinces being usually unmolested and well governed. Tiberius (14-37) first ruled with wisdom and moderation, but afterward became suspicious, cruel and tyrannical. During this reign occurred the preaching and crucifixion of Jesus Christ. Tiberius was followed by three other emperors of the Claudian house, Caligula (37-41), Claudius (41-54) and Nero (54-68). One of the most important events during this period was the conquest of Britain, during the reign of Claudius. Under Nero occurred the burning of Rome, which was followed by a cruel persecution of the Christians.

After the three short reigns (68-69) of Galba, Otho and Vitellius, the favorite commander Vespasian (69-79) was chosen emperor. His reign and that of his son Titus (79-81) were notably prosperous and free from tyranny. It was during the reign of Titus that the eruption of Vesuvius occurred, by which Pompeii and Herculaneum were destroyed. Diocletian (81-96), the last of the twelve Cæsars, was followed by the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius, whose reigns were happy and prosperous. Under Trajan, the Roman Empire extended its boundaries to the farthest limits attained in its history. Hadrian, realizing that the Em-



ROMAN DOMAIN (IN BLACK)

ROME

The Republic

509-31 B.C.

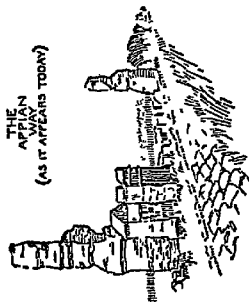
*CHRONOLOGICAL SUMMARY- B.C.	
Republic Established.....	509
Sack of Rome by the Gauls.....	590
The Samnite Wars.....	543-290
The Punic Wars.....	264-146
The Macedonian Wars.....	215-168
The Mithridatic Wars.....	89-63
Julius Caesar.....	59-44
Battle of Philippi.....	42
Battle of Actium.....	31



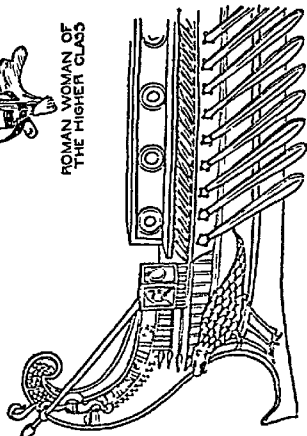
POMPEY THE GREAT



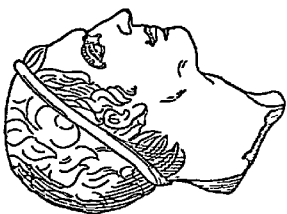
ROMAN WOMAN OF THE HIGHER CLASS



THE APPIAN
ROAD
(AS IT APPEARS TODAY)



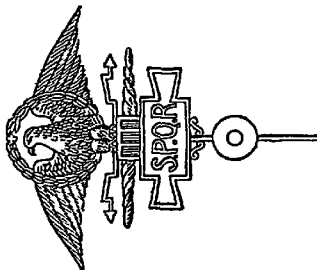
PROW OF A ROMAN WAR SHIP



JULIUS CAESAR



A ROMAN SOLDIER



THE ROMAN STANDARD
BESIDE THE TOMB OF
"THE SENESE AND ROMAN PEOPLE"



DENARIUS OF CAESAR
(SILVER)

pire was in danger if its boundaries were extended too far, relinquished the contests which Trajan had made beyond the Danube and beyond the Euphrates. Under Marcus Aurelius occurred the conflict with the Marcomanni, which marked the beginning of the long and desperate struggle of Rome with the German tribes.

With the reign of Commodus (180-192) began the decline of the Roman Empire. This was at first gradual, but incompetent rulers and invincible hordes of barbarians hastened the inevitable fall. Under Septimius Severus (193-211) occurred a change in the attitude of the imperial government toward Christianity, and under his protection this religion began to make rapid progress throughout Roman dominions. Alexander Severus (222-235) gave Rome an able government and sought to check the military supremacy and corrupt tendencies of the time. The period of anarchy (251-268), during which various claimants to the imperial dignity were constantly warring among themselves, seemed about to cause the dissolution of the Empire, but it was saved for a time by the succession of five good emperors, Claudius, Aurelian, Tacitus, Probus and Carus. Of these the most famous is Aurelian (270-275).

With the reign of Diocletian (284-305), the last trace of republicanism vanished, and Rome became an absolute monarchy. This saved the Empire for nearly 200 years more, although the appointment of Maximian to the post of joint emperor began the division of government administration which finally resulted in the separation of East and West. Diocletian is remembered for his terrible persecution of the Christians. This was the last pagan persecution of the Church, for under Constantine the Great (sole emperor, 323-337), Christianity became the state religion. In 330 the capital of the Empire was moved to Byzantium, afterward Constantinople. The division of the Empire among Constantine's sons led to a struggle which lasted till 350, when Constantius became sole emperor. He was succeeded by Julian the Apostate (361-363), so called because of his efforts to restore paganism.

In the reigns of the joint emperors, Valentinian and Valens, the barbarian tribes on the north again became threatening, while in Africa the Moors, and in Britain the Scots and Picts, almost destroyed the Roman suprem-

acy. In 376, after the death of Valentinian, the Visigoths, fleeing from the Huns, were allowed by Valens, who still ruled in the East, to cross the Danube and settle as allies. The agents of the government exasperated them by unfair dealing, and the result was a battle in which the Romans were defeated (378); but under Theodosius the Great (379-395) the Romans succeeded in subduing the Goths.

At the death of Theodosius, the Empire was divided between his sons, Arcadius and Honorius, the latter receiving the West, the former becoming ruler of the Byzantine Empire. Between the East and West, jealousy arose, and one power often saved itself from the barbarians by inducing them to turn their hordes against the other. The Goths under Alaric were defeated by Stilicho, the general of Honorius, first in Greece and later in Italy, but after the death of Stilicho they returned and captured and sacked Rome. Meanwhile, in the provinces, the Roman rule had ended with the withdrawal of the legions to defend Italy. The Visigoths founded a kingdom in Southern France and Spain, and the Vandals took possession of Northern Africa. When the Huns, under Attila, appeared, and after exacting tribute from the Eastern emperor, descended upon Gaul, the united Roman and Gothic armies opposed them at Châlons and defeated them (451). The following year, Attila marched into Italy and threatened Rome, but was induced by the pleas of Leo the Great, the Christian bishop, to spare the city. In 455 the Vandals under Genseric captured the city and plundered it for two weeks. Between 456 and 472 Count Ricimer created and deposed emperors at will.

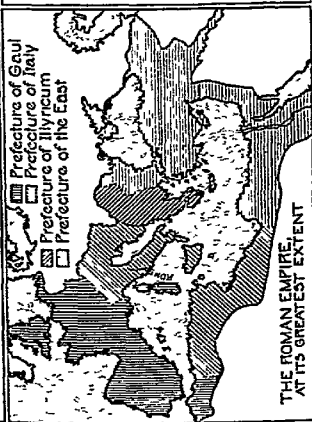
The last of the Roman emperors, strangely enough, bore the name of Romulus, but was surnamed Augustulus. In 476 Odoacer de-throned this child emperor and took the title of king of Italy; he thus brought the Roman Empire in the West to an end. Rome now became a province of the Byzantine empire and was ruled in theory, sometimes in fact, from Constantinople, until, in 800, the crown of the Western Empire was placed on the head of Charlemagne.

Related Articles. Consult the following titles for additional information:

HISTORICAL TOPICS

Agrarian Laws	Cimbri
Atrium	Comitia
Augurs	Consul
Byzantine Empire	Decemvirs
Carthage	Etruria
Censors	Fasces

☒ Prefecture of Gaul
☒ Prefecture of Italy
☒ Prefecture of Illyricum
☒ Prefecture of the East

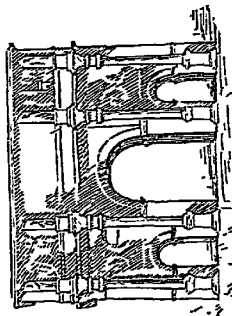


THE ROMAN EMPIRE,
AT ITS GREATEST EXTENT

ROME

The Empire

31 B.C.-476 A.D.



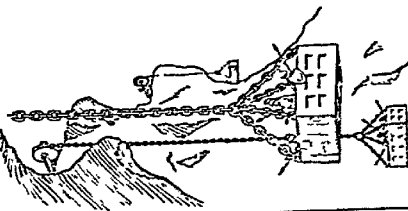
ARCH OF CONSTANTINE



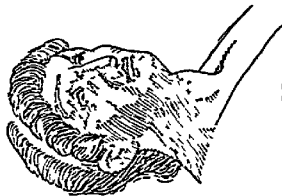
MARCUS AURELIUS



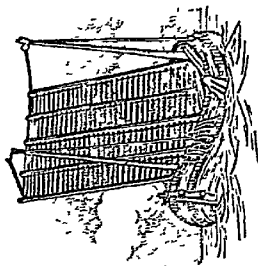
COIN OF VESPASIAN



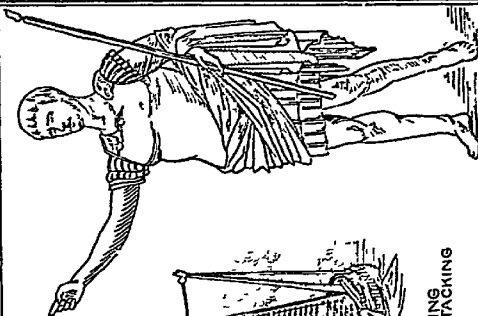
METHOD OF ATTACK FROM ABOVE



NERO



SHIP WITH SCALING
LADDER, FOR ATTACKING
A SEA WALL



EMPEROR AUGUSTUS
FROM A STATUE IN THE VATICAN

HERMES

Chronological Summary

Reign of Augustus Caesar, from 31 B.C. to	4
Burning of Rome	64
Jerusalem Destroyed by Titus	70
Destruction of Herculaneum and Pompeii	79
Conquest of Britain	83
Christianity Becomes the State Religion	313
Final Division of the Empire	395
Sack of Rome by Alaric	410
Rome Pillaged by Vandals	455
End of Roman Empire	476

Gladiator
Goths
Helvetii
Huns
Legion
Lictors
Lupercalia
Patrician
Plebeians
Praetor
Praetorian Guard
Punic Wars
Quæstor

Quirinal
Sabines
Sannites
Saturnalia
Tarpæian Rock

Tiber
Toga
Tribune
Triumph
Triumvirate
Twelve Tables, Law of the

BIOGRAPHY

Agricola, Gnaeus J.
Antony, Mark
Augustus
Aurelian, Lucius
Aurelius, Marcus
Brutus, Decimus
Brutus, Marcus
Caesar, Caius Julius
Calligula
Cataline
Cato, Marcus Porcius
Cicero, Marcus Tullius
Cincinnatus, Lucius
Claudius
Cleopatra
Constantine
Crassus, Marcus L.
Diocletian
Domitian
Galba, Servius
Gracchus
Hadrian
Hamilcar Barca
Hannibal
Jugurtha
Julian

Justinian I
Lepidus, Marcus A.
Lucretia
Marius, Caius
Mithridates
Nero
Nerva
Numa Pompilius
Pompey
Pyrrhus
Romulus
Scipio, Publius C.
(father and son)
Seneca, Lucius A.
Servius, Tullius
Sulla, Lucius C.
Tarquinius, Lucius
Theodoric
Theodosius
Tiberius
Titus
Trajan
Valens
Valentinian I
Valentinian III
Vespasian

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Aeneid
Caesar, Caius Julius
Cicero, Marcus Tullius
Horace
Justinian I
Livy

Plautus
Pliny
Quintilian
Tacitus, F. C.
Terence
Vergil

ROME, GA., the county seat of Floyd County, seventy-two miles northwest of Atlanta, on the Oostanaula and Etowah rivers, where they unite to form the Coosa, and on the Central of Georgia and the Southern railroads, and it contains cotton and hosiery mills, machine shops, an iron furnace, planing mills, and stove works. There is an airport. Population, 1930, 21,843.

ROME, N. Y., in Oneida County, fifteen miles northwest of Utica, at the junction of the Erie, Barge and Black River canals, on the Mohawk River and on the New York, Ontario & Western and several lines of the New York Central railroad. There are manufactures of steel rails, locomotives, brass and copper goods, electrical goods, soap, wire and textiles. Fort Stanwix was built on the site of the present city in 1758, and near here several battles of the Revolution were fought. Population, 1930, 32,338.

ROMEO AND JULIET, ro'meo and joo'-li et, one of Shakespeare's tragedies. It was first printed in 1597, and was followed by a corrected edition two years later. The direct source of the plot is credited to an English poem, the *Tragical Historye of Romeus and*

Juliet, written by Arthur Brooke in 1562. The story, which has no historical foundation, concerns itself with the love of Romeo, of the house of Montague, and Juliet, of the house of Capulet. Between these two families a hatred was carried from generation to generation, and only over the dead bodies of the two lovers was the enmity cast aside and a reconciliation effected.

The rôle of the central figures has been a favorite of many actors and actresses of note. Bellini and Gounod each made the tragedy the subject of an opera.

ROMULUS, the mythical founder and first king of Rome, was the son of Silvia, the daughter of Numitor, king of Alba. By the god Mars she became the mother of the twins Romulus and Remus. Their uncle, Amulius, who had driven Numitor from his throne, ordered the twins to be set afloat in a basket on the Tiber. The basket, according to the story, was stranded beneath a fig tree, at the foot of the Palatine Hill, and the boys were suckled by a she-wolf and fed by a woodpecker, until they were accidentally found by Faustus, the king's herdsman, who took them home and educated them.

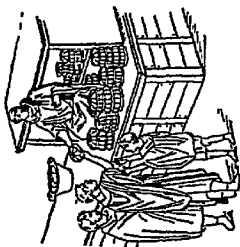
When they had grown up and become aware of their parentage, they organized a band of enterprising comrades, by whose help they deposed Amulius and reinstated Numitor on his throne. They next resolved to found a city, but as they disagreed as to the best site for it, they resolved to consult the omens. The decision was in favor of Romulus, who immediately began to raise the walls.

Since surrounding tribes would not allow their daughters to marry the Romans, whom they looked upon as outlaws, the founders of the new city stole their wives from the Sabines. This led to a war, which was, however, ended at the entreaties of the Sabine wives, and from that time Romulus and the Sabine king ruled side by side. Romulus is said to have miraculously disappeared in a thunderstorm. The date of the founding of Rome was usually given as 753 B. C., and that of the death of Romulus, as 716 B. C.

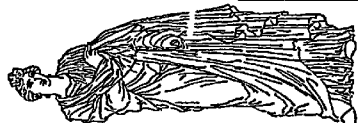
ROOK, a European bird of the crow family. In habit it is somewhat like the crow and the magpie, but differs from all other birds of this group in that it feeds entirely on grains and insects, has purplish plumage and sheds its face feathers on maturity. The most northern birds migrate in winter. Rooks nest in great colonies called rookeries.

ROME

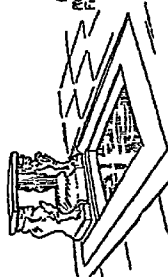
Social Customs and Manners



BREAD SHOP



ROMAN MATRON
From a Statue in the
Vatican



COURTYARD FOUNTAIN



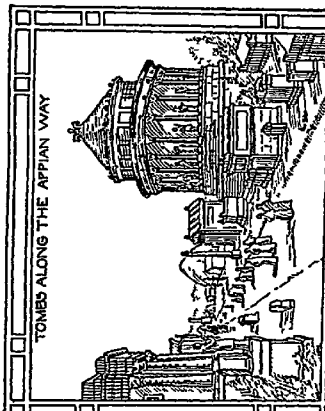
SEAL RING



WATER BOTTLE



GLASSWARE



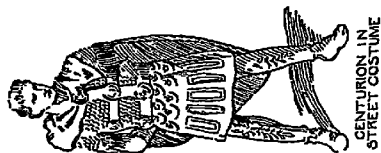
TONES ALONG THE APPIAN WAY

SOCIAL CUSTOMS

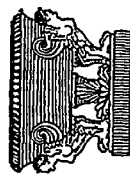
HOMES	MARRIAGE
Architecture	Preparation
Family Life	Ceremony
Social Life	Dress
Games	Distinctions
SLAVERY	The Toga
Origin	The Tunic
Influence	DEATH
Number of Slaves	Funerals
How Employed	Ceremonies



DOLLS



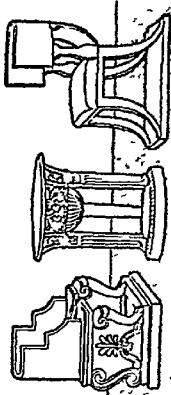
CENTURION IN
STREET COSTUME



CISTERN



SPOONS



CHAIRS AND TABLE

ROOSEVELT, FRANKLIN DELANO (1882-), the thirty-second President of the United States, is the second member of the Roosevelt family to occupy that office, he and former President Theodore Roosevelt having been fifth cousins.

Franklin Roosevelt was born Jan. 30, 1882, at Hyde Park, N. Y. There he spent his boyhood, eventually going to Groton School, and to Harvard University, where he graduated in 1904. He attended the Columbia University Law School and was admitted to the New York bar in 1907, and there engaged in law practice until 1910. While still in law school he married, on Mar. 17, 1905, Anna Eleanor Roosevelt, a niece of Theodore Roosevelt. They had five children—James, Anna, Elliot, Franklin D. Jr., and John A.

In 1910 Roosevelt ran as a Democrat for the State Senate in the Hyde Park district, which was usually Republican, and was elected. In Albany he achieved prominence for his forceful and successful opposition to Tammany's nominee for the United States Senate. In the presidential campaign of 1912 he actively supported Woodrow Wilson, and in 1913 President Wilson appointed him Assistant Secretary of the Navy. In this position he performed valuable service in the organization of an efficient naval establishment. In the Democratic National Convention in 1920, which nominated James M. Cox of Ohio for the Presidency, Roosevelt received the nomination for the Vicepresidency. In 1928, at the urgency of Gov. Alfred E. Smith, Roosevelt became a candidate for the governorship of New York, and was elected by a majority of 25,000, which was increased to 725,000 when he was reelected in 1930.

During his two terms as Governor, Franklin Roosevelt inaugurated or supported many measures which gave him a nation-wide reputation. His efforts in behalf of state-owned, state-controlled hydro-electric power and of extensive plans for reforestation attracted wide public attention.

He was nominated for the Presidency by the National Democratic Convention in Chicago on July 1, 1932, and broke all precedents by flying with members of his family from Albany to Chicago on that day to deliver his acceptance speech to the delegates while still in session. In the November elections he was elected President by a plurality of 7,000,000 in the popular vote, and by 472 to 59 in the electoral vote.

His term of office began when the nation was in the deepest period of a world-wide depression. Stagnation in business, huge unemployment figures, bank failures (4,367 within four years), presented problems which appeared to be almost incapable of solution. The new President closed all banks for nearly a week; those that were solvent opened with renewed confidence of the public. The administration struck out boldly to remedy national ills; Congress "adjourned" politics to give the President unanimous support in his plans to build up what was announced as an approach to a new social order. A National Industrial Recovery Act (NRA) was passed as the charter of the new order to establish new ideals throughout all industries in their various relations. It was declared unconstitutional, in large part.

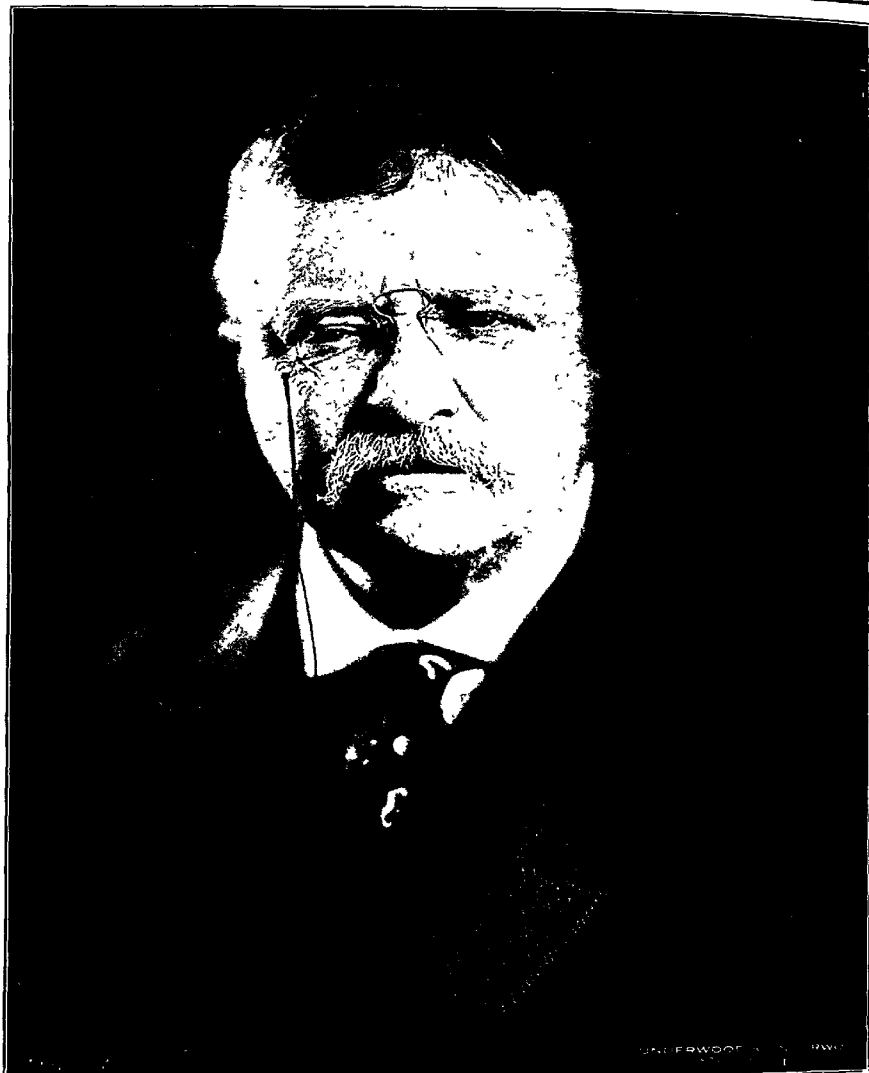
To meet a deplorable situation in the farming community, an Agricultural Adjustment Administration act (AAA) was passed, designed to increase income of farmers by improving distribution and reducing production. To reduce unemployment a Public Works Administration law (PWA) was enacted, carrying a fund of \$3,300,000,000 for expenditure on public construction enterprises. The Civilian Conservation Corps (CCC) engaged young men in forestry and flood control. About forty devices were authorized to fight the depression.

Within two years it was apparent that some of the means employed were not effective. Billions of dollars had been spent, resulting in a vast increase in the public debt; unemployment was still large, agriculture had not been lifted far toward the ends sought. Devaluation of the dollar had increased prices, but there had not been an appreciable increase in wages as an offset. By the middle of 1934 there developed outspoken opposition. However, in the Congressional elections of that year the President received almost unprecedented support for his policies in the election of a Congress overwhelmingly Democratic.

The popularity of the President was not due wholly to belief in the ultimate success of the many devices he employed to restore prosperity to the nation. Possibly the greatest element which at first drew to him almost universal favor was his boldness in the face of seeming disaster. In the Democratic national convention in 1936 he met no opposition for renomination.



FRANKLIN DELANO ROOSEVELT
PRESIDENT OF THE UNITED STATES

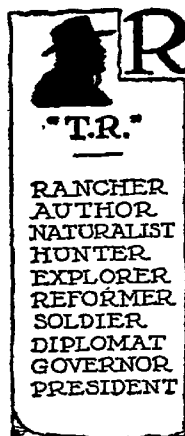


THEODORE ROOSEVELT

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"The corner-stone of the Republic lies in our treating each man on his worth as a man, paying no heed to his creed, his birthplace, or his occupation, asking not whether he is rich or poor, whether he labors with head or hand; asking only whether he acts decently and honorably in the various relations of his life; whether he behaves well to his family, to his neighbor, to his State.

"There can be no divided allegiance here. Any man who says he is an American, but something else also, isn't an American at all. We have room but for one flag, the American flag. We have room for but one language here and that is the English language, for we intend to see that the crucible turns our people out as Americans, of American nationality; we have room for but one soul loyalty, and that is loyalty to the American people."



ROOSEVELT, *ro'seh velt*, THEODORE (1858-1919), the twenty-sixth President of the United States. His death, on January 6, 1919, brought to a close one of the most useful, interesting and active careers in American history. For nearly two decades Theodore Roosevelt had been a vital figure in the life of the nation; a storm center of political thought; a clear and definite voice on all subjects which affected his fellowmen. He was not only a statesman and political

leader, but a reformer, traveler, writer, naturalist, bookman and athlete. Whatever interested humanity interested him. Like all men who speak and act with decision, he had bitter enemies as well as enthusiastic friends, but without doubt he will go down in history as the outstanding figure in the political and economic movement that transformed America in the opening period of the twentieth century.

Early Life Theodore Roosevelt was born on October 27, 1858, in the city of New York. The Roosevelt family had taken root on American soil two centuries before, in 1650, when a certain ambitious burgher of the Dutch family of Van Rosenvelt emigrated from Holland. The Roosevelts, as they came to be called, fared well financially and socially, and eventually were included among the wealthy and exclusive families of old New York. The father of the twenty-sixth President, also named Theodore, was a prosperous business man, who interested himself not only in finance, but in public affairs and philanthropy. He married Miss Martha Bulloch, of a well-known Southern family, and a descendant of the first governor of the state of Georgia.

It is an interesting fact that Theodore Roosevelt, the future President, who was noted for abounding vitality and extraordinary powers of endurance in his manhood, was a weakling as a boy. To overcome this handicap he courted health and strength by persistent exercise, and though his early schooling was somewhat irregular, he entered Harvard at the age of eighteen. After his

graduation, in 1880, he studied law for a time at Columbia University, with the purpose, however, of broadening his mind rather than of preparing for the legal profession.

First Steps in Politics. In the fall of 1881, when he was just twenty-three years of age, Roosevelt won a seat in the lower house of the New York legislature. He was, to use his own words, a Republican by "education and inheritance," and he elected to work within that party. At that time the era of machine politics was at its height, and young Roosevelt threw himself heart and soul into a campaign against political bosses, spoilsmen and corruptionists. He was re-elected in 1882 and 1883.

A Ranchman. Roosevelt declined to run a fourth time for the legislature, and in 1884 he bought a ranch in North Dakota, seeking in Western life a respite from the strain of politics and domestic sorrows. In February of that year he lost his mother and his wife, the latter a daughter of George Cabot Lee of New York. As Alice Hathaway Lee she had married the young Harvard graduate in October, 1880, and had become the mother of a daughter, Alice, who later married, in the White House, the Hon. Nicholas Longworth, member of Congress from Ohio.

On his Elkhorn Ranch, Roosevelt, though introduced as a "four-eyed tenderfoot," won the friendship of the other ranchers by his honesty and readiness to "play the game." In 1886, while at Elkhorn, he was nominated for mayor of his home city of New York by a strong coalition of Republicans and Independents.

Public Life Resumed. Roosevelt was defeated in a three-sided contest, in which he had as opponents a Democrat and the well-known single-taxer, Henry George. The following December he married in London, England, Miss Edith Kermit Carow. On his return to New York he quickly resumed his political activities, made campaign speeches for Harrison in 1888, and in 1889, after the latter's election, accepted a position as chairman of the Civil Service Commission. Always a vigorous foe of the spoils system, he impartially enforced the provisions of the civil service law.

Roosevelt was retained on the commission by Cleveland, Harrison's successor, but in 1895 he resigned to become president of the board of police commissioners of New York City. Enforcement of the laws and the

elimination of bribery were two policies with which his name became identified

In 1896 he entered the campaign for McKinley. He was not a polished speaker, but he could win his audiences through his energy and his whole-hearted belief in his own arguments. There was vitality and honesty in his speeches, backed by a personality as distinctive as that of any opponent.

When McKinley began his first term as President the island of Cuba was in the turmoil of a revolution to which the American people were forced to give increasing attention. Roosevelt believed that the United States would have to intervene sooner or later, and he was given an opportunity to help the country prepare for such an emergency. In April, 1897, McKinley appointed him Assistant Secretary of the Navy. He brought about a much-needed improvement in naval marksmanship, besides bringing the whole department up to a higher standard.

The Rough Riders. The declaration of war, in April, 1898, gave him another opportunity to serve his country. Resigning his department position, he organized the first United States Volunteer Cavalry, popularly and appropriately known as the "Rough Riders." The regiment was made up chiefly of cowboys from the Western plains, and it included many picturesque characters; in it, too, were Roosevelt admirers from the best families of the East. Assisting in its organization was Leonard Wood, its first colonel. Roosevelt himself was lieutenant-colonel, but when Wood rose to the rank of brigadier-general, his comrade in arms was promoted to be colonel, and it was he who led the Rough Riders in their great charge over San Juan Hill. In later years, he was universally spoken of as "Colonel."

Governor of New York. In September, 1898, Roosevelt was mustered out, and on January 1, 1899, he entered upon his duties as governor of New York. He had secured the nomination through the aid of the state "machine" leader, Senator Thomas C. Platt. At the same time Roosevelt bound himself in no way to follow the orders of the "bosses," and he gave the state an honest, efficient and progressive administration. If the politicians came his way, as he once said, he worked with them; if not, he worked without and in spite of them. As his term of office drew to a close Platt and other Republican leaders decided it was time to eliminate this trouble maker,

whose investigation of the state canal system and fearless attitude toward the corporate interests were interfering with the smooth running of the "machine." Accordingly, in 1900 they forced on him the nomination for the most deadening office in the national government—the Vice-Presidency. The ticket, headed by McKinley, won by a comfortable margin over the opposition, led by Bryan.

President of the United States. Six months after his inauguration, President McKinley was struck down by an assassin's bullet, and on September 14, 1901, Theodore Roosevelt took the oath as chief executive. The "trouble maker," disliked by the "bosses," was the most powerful man in America and beloved by the people. He was then only forty-three years of age, the youngest President in American history, and he came to the high office superbly trained and in vigorous health. The new President announced that he would continue unchanged the policies of McKinley, and he asked all of the latter's Cabinet officials to remain. It was a strong Cabinet, containing such men as Elihu Root, who was Secretary of War, and John Hay, who was Secretary of State. In 1904 Roosevelt expressed his desire to be elected for a full term, and he was nominated by the Republican convention by acclamation. In the election he defeated the democratic nominee, Judge Alton B. Parker, by a popular majority of almost 2,000,000. The chief issue was the President's personality; he was accused by his opponents of recklessly violating his constitutional limitations, of invading the rights of Congress, and of being dangerously warlike. The election of 1904 showed what the people thought of these accusations.

Domestic Affairs. Roosevelt's seven and one-half years of office constitute a notable period of readjustment. When he became President the country was emerging from an era of industrial development in which "big business" had expanded without restraint. Corporate interests were wielding a pernicious influence on legislation, state and national, and the mass of the people, already awakened to this fact, were letting their



THEODORE
ROOSEVELT

murmurs be heard Indicative of the general unrest was the great anthracite coal strike of 1902, which was settled only after the President personally urged the employers and workers to arbitrate their dispute. McKinley's moderate program of trust legislation was not only carried out vigorously but expanded by his dynamic successor, who was keenly sensitive to the volume of discontent in the country as a whole. A great body of reform legislation was the tangible result. It included the Hepburn Railway Rate Act, the Federal meat-inspection and pure-food laws, and laws for the supervision of trusts, for a systematic method of tariff alteration, and for betterment of labor conditions. Suits were brought against various railways and other corporations, including the Standard Oil Company.

In this fight for more equitable conditions the reactionary elements bitterly criticized the President for "upsetting industrial stability." It is true that a moderately-serious financial panic occurred in 1907, but at that time the nation lacked the stabilizing influence of the present Federal Reserve system. The panic showed the need of currency reform, however, and in 1908 Congress passed the Aldrich-Vreeland Bill, providing for the issuance of emergency currency. Out of this came the establishment of a Monetary Commission in 1910, and the subsequent creation, in the first Wilson term, of the Federal Reserve system.

In line with Roosevelt's attitude toward the business interests was his great conservation policy. He gave definite shape to the movement for preserving the nation's natural resources by calling a conference of governors and other public men to discuss the subject, and by appointing a conservation commission to make an inventory of the national resources. During his administration over 234,000,000 acres of mineral and timber lands and water sites were placed under government control. Congress also passed a Reclamation Act providing for the irrigation of arid lands in the West. The scope of the Department of Agriculture was greatly extended, and in 1903 a new Department of Commerce and Labor (later divided into two departments) was created. Other constructive measures included the establishment of the Census Bureau on a permanent basis, the creation of a Bureau of Immigration, the enactment of a uniform naturalization law and the creation of a general staff for the

army. As a consistent advocate of military preparedness the President worked for a larger navy, and to stimulate interest in this arm of the national defense he sent the battle fleet on a trip around the world.

Foreign Affairs During the Roosevelt period the country was at peace and was respected throughout the world. Perhaps the most remarkable result of American diplomacy was the acquisition by the United States of a strip of land across the Isthmus of Panama. In 1903 the State Department negotiated a treaty with the state of Panama, which had seceded from Colombia, authorizing the United States to build a canal across the isthmus. The President was criticized for having had a part in the Panama rebellion, but the people as a whole believed that he did the only thing possible to prevent indefinite delay, and they upheld him. Certainly the construction of the great Panama Canal will always be linked with his name.

The principle of international arbitration was vigorously applied by the President. He persuaded Great Britain and Germany to submit certain claims against Venezuela to arbitration, and the Alaska boundary dispute between the United States and Great Britain was settled in like manner. In 1906 an insurrection in Cuba caused the United States to intervene in the affairs of the island republic, but true to its promises, the American government withdrew its power when order was restored. In the Philippines civil government was successfully put into operation, and the islands were brought closer into communication with America by the laying of a cable across the Pacific. Undoubtedly the greatest personal triumph of Roosevelt in the field of diplomacy was his intervention in the war between Russia and Japan. He intervened by inviting the Russian and Japanese governments to send peace commissioners to America, and as a result a treaty of peace was signed at Portsmouth, N. H., in September, 1905. The following year the President was awarded the Nobel peace prize, for services in behalf of international harmony.

Other Events One state—Oklahoma—entered the Union during this administration, and there occurred one great disaster, the San Francisco earthquake and fire. A great international exposition was held at Saint Louis in 1904, in commemoration of the Louisiana Purchase; a year later the Lewis and Clark Exposition was held at Portland,

Ore., and in 1907 the Jamestown Tercentennial was celebrated at Hampton Roads, Va. In 1908 the nation mourned the passing of Ex-President Cleveland.

As Roosevelt's second term drew to a close there was a strong movement for his renomination, but he declined in favor of his Secretary of War, William H. Taft, who had won a notable reputation as civil governor in the Philippines. In the ensuing election the Republican ticket won by an electoral vote of 321 to 162. The Democratic candidate, William J. Bryan, was thus defeated for the third time.

A Great Ex-President. The last decade of Roosevelt's life was crowded with incident. He retired from the Presidency in the prime of physical and mental vigor, and to the day of his death he lived in a world of action. As soon as he was free from the claims of office he departed on a hunting trip to Africa with his son Kermit. Several valuable trophies of this expedition are now a part of the zoological collection in the Smithsonian Institution, Washington. On his journey home, in 1910, Roosevelt visited several European countries, lecturing meantime, at the universities of Berlin, Christiania and Oxford, and at the Sorbonne, Paris. Everywhere he was welcomed as the greatest American citizen, much to the gratification of the American people, who gave him an unprecedented welcome when he landed in America.

Back in Politics. When Roosevelt returned home he found a marked cleavage in the ranks of the Republicans. His personal choice for the Presidency, Mr. Taft, was definitely aligned with the regulars, or conservatives, and his own followers, the progressives, or insurgents, were in revolt. In response to a great popular demand that he resume leadership of the party, Roosevelt announced his candidacy for the Presidential nomination early in 1912, and in the spring primaries he carried state after state. Nevertheless, in the national convention which met at Chicago in the summer of 1912 the conservatives had control, and Taft secured the nomination. Amid scenes of great excitement as the roll call ended, the Roosevelt delegates marched out of the assembly hall and held a protest meeting of their own in another auditorium. This revolt was more than a party split; it resulted in the organization of a new Progressive party, with a platform calling for social reform, the initiative and referen-

dum, the recall of judicial decisions, woman suffrage and other radical measures.

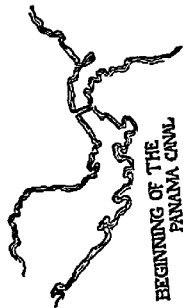
A Progressive convention was held later in the summer, at which Roosevelt was nominated for President, and Hiram Johnson, governor of California, was named for Vice-President. In a campaign unmatched for bitterness Roosevelt toured the country, speaking with equal vigor against his Republican opponent and his Democratic rival, Woodrow Wilson. Late in the campaign, as he was about to enter a carriage which was to take him to an assembly hall in Milwaukee, he was shot by a deranged man. Before he would submit to medical attention, however, he proceeded to the hall and delivered his address. This incident ended his active part in the campaign, but in the election he carried more states and secured more votes than the Republican nominee. The Democrats stayed in their own camp, and, profiting by the divided Republican vote, carried forty states.

The Progressive party was permanently organized, but it did not hold the rank and file of Republicans, and in course of time the organization disappeared. Roosevelt himself returned to the Republican fold in the campaign of 1916, and actively supported Charles E. Hughes. He believed that the great revolt of 1912 had put new life into the historic party and had saved it from becoming hopelessly reactionary. Therefore, he never regretted the step he took, though he made lasting enemies thereby.

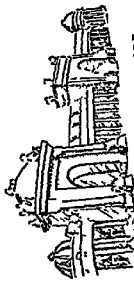
South American Trip. An exploring expedition to South America followed the dramatic events of 1912. In 1913 Roosevelt delivered addresses before several South American universities and learned societies, and between February and April, 1914, he led an exploring party for 600 miles along an unknown tributary of the Madeira River. Subsequently the Brazilian government named this stream the Rio Teodoro in his honor. While in the South American jungles he contracted a fever which nearly caused his death, and permanently undermined his health.

Roosevelt and the World War. Roosevelt was strongly opposed to the pacifist tendencies of President Wilson, and criticized him both for his cautious attitude in regard to Mexico and for his method of dealing with the complications arising from the World War. When the war began, in 1914, he believed, with the majority of Americans, that the

ROOSEVELT'S ADMINISTRATION 1901-1909



BEGINNING OF THE
PANAMA CANAL



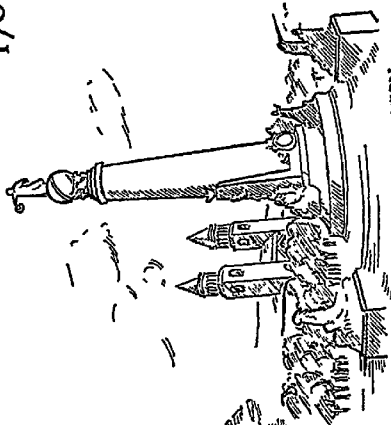
LEWIS AND CLARK EXPOSITION



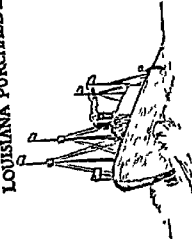
ANTHRACITE COAL STRIKE



GOVERNMENT ESTABLISHED
IN THE PHILIPPINES



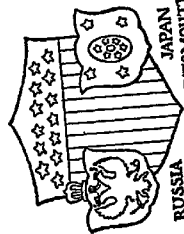
LOUISIANA PURCHASE EXPOSITION



PACIFIC CABLE LAID



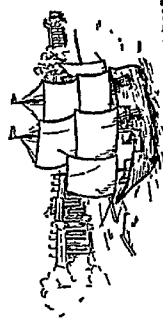
DEATH OF GROVER CLEVELAND



RUSSIA
JAPAN
TREATY AT PORTSMOUTH



CONSERVATION CONGRESS



JAMESTOWN EXPOSITION



SAN FRANCISCO
EARTHQUAKE, 1906

The Administration of Theodore Roosevelt, 1901-1909

I. THE PRESIDENT

- (1) Birth
- (2) Education
- (3) Public Life
- (4) Military career
- (5) As an author
- (6) Character

II. GOVERNMENTAL AFFAIRS

- (1) Important laws
 - (a) Elkins Anti-trust Act, 1903
 - (b) Railway Rate Regulation
 - (c) Pure food and meat inspection laws
- (2) Administrative
 - (a) Reclamation and Irrigation Service established, 1901
 - (b) Census Office made a permanent bureau
 - (c) Department of Commerce and Labor established
 - (d) Reorganization of the army
 - (e) Conservation Congress
- (3) Foreign
 - (a) Relations with Venezuela
 - (b) Santo Domingo
 - (c) Cuba
 - (1) Reciprocity treaty
 - (2) U. S. provisional government
 - (d) The Isthmian Canal question
 - (1) Hay-Pauncefote treaty
 - (2) Attempts to negotiate with Colombia
 - (3) Revolution and establishment of republic of Panama
 - (4) U. S. treaty with Panama
 - (5) Construction of the canal by the United States
 - (e) Treaty of Portsmouth, 1905
 - (f) Cruise of a United States fleet around the world

III. LOCAL AND INTERNAL AFFAIRS

- (1) Expositions
 - (a) Louisiana Purchase
 - (b) Lewis and Clark
 - (c) Jamestown

- (2) San Francisco earthquake and fire
- (3) Pacific Cable laid
- (4) Anthracite coal strike
- (5) Northern Securities Case
 - (a) Northern Securities Company controlled both the Great Northern and the Northern Pacific railroads
 - (b) Court held that competing railroads could not be so controlled
- (6) New York insurance investigation
 - (a) Corruption and illegalities
 - (b) Charles Evans Hughes
- (7) Panic of 1907
 - (a) Financial crisis
 - (b) Causes
- (8) Admission of Oklahoma
- (9) Death of Grover Cleveland
- (10) Elections of 1904 and 1908
 - (a) Issues
 - (b) Candidates

Questions on Roosevelt

Give a brief account of Theodore Roosevelt's career before he became President.

What reform measures were passed in his administration?

What did the pure food laws accomplish?

What is the Reclamation Service?

When was the Department of Commerce and Labor established?

How was it later divided?

What was the Conservation Congress?

What did the Hay-Pauncefote Treaty accomplish?

When was the republic of Panama established?

What can you say about the Treaty of Portsmouth?

What great expositions were held in the United States during Roosevelt's administration?

What are the Nobel Prizes?

Who is Charles Evans Hughes?

When and how did he become prominent?

United States should remain neutral. Later, as Germany's disregard for the rights of humanity, as typified by the sinking of the *Lusitana*, became more flagrant, he was openly anti-German, and urged that America intervene. When the decisive step was taken he longed to be in the thick of the fight, and offered to lead a volunteer division in France. This honor was denied him, but he gave his four sons to the cause, all of whom won honor in active fighting. His youngest son, Quentin, lost his life as an aviator, and lies buried in France.

Throughout the period of American participation Roosevelt unsparingly criticized anyone, from the President down, who he thought was not energetic enough in carrying on the struggle. Possibly his criticisms were not always just, but a man of his temperament could not do otherwise.

This exponent of the "strenuous life," whose career was a series of hard-fought battles, died quietly in his sleep, at Sagamore Hill, his home at Oyster Bay, on the morning of January 6, 1919. He had lived to see the triumph of the cause that meant so much to him, but, in the words of a contemporary observer, "If his biographers read his end aright, they will see him as a man who died when and how he did chiefly because of an overwhelming but frustrated desire to join his fellow countrymen in the great fight."

The Roosevelt Writings. The marvelous versatility of Theodore Roosevelt is shown in the great body of writings which he left. Both for style and for subject matter these writings are of permanent value and interest. His first book, *History of the Naval War of 1812*, he published in 1882; he was still writing in the last year of his life. The Roosevelt publications fill twenty-five volumes, and include history, biography, narratives of the writer's travels, collections of lectures and essays on varied subjects, an autobiography and nature sketches. Representative titles include *Winning of the West*, *Life of Gouverneur Morris*, *The Strenuous Life*, *True Americanism*, *The New Nationalism*, *African Game Trails* and *Fear God and Take Your Own Part*.

Related Articles. Various events and topics referred to in this article are given fuller treatment under the following headings:

Cleveland, Grover	Political parties in the
Colombia	United States
Conservation	Pure Food Laws
Cuba (history)	Rough Riders
McKinley, William	Spanish-American War
Nobel Prizes	Taft, William H.
Panama Canal	Trusts

ROOSEVELT DAM See **IRRIGATION**.

ROOT, in mathematics, one of the equal factors of a number or quantity, or a number or quantity which when multiplied by itself one or more times will produce a given number or quantity. To illustrate, since $4 \times 4 = 16$, 4 is a root of 16; again, since $5 \times 5 \times 5 = 125$, 5 is a root of 125. Square root is one of two equal factors of a quantity, and cube root is one of three equal factors. See **EVOLUTION**; **SQUARE ROOT**; **CUBE ROOT**.

ROOT, ELIHU (1845-), an American statesman, diplomat and corporation counsel, prominently identified with the affairs of his country for nearly two score years. He was born at Clinton, N. Y., and was educated in that town at Hamilton College. After his graduation in law at New York University he was admitted to the bar, and in 1867 began the practice of law in New York City. Root's first public office was that of United States district attorney for the New York southern district. This office he held from 1883 to 1885. He was later prominent in Republican politics, and in 1899 succeeded Russell A. Alger as Secretary of War in McKinley's Cabinet. When Roosevelt became President he retained Root as head of the War Department, and the latter served with distinction until 1904, when he retired to practice law. In 1905 he succeeded John Hay as Secretary of State, and in 1909 he entered the United States Senate. While in the Senate he acted as counsel for the United States in the arbitration of the North Atlantic fisheries dispute (1910), and in the same year was appointed a member of the Permanent Court of Arbitration at The Hague. For his activities in behalf of international peace he was awarded the Nobel prize for peace in 1912.

Root retired from the Senate in 1915. In 1917 President Wilson appointed him chairman of the American commission to Russia, which conferred with the leaders of the new democratic government on economic and financial matters. After the war Root was retained as counsel by the brewing interests of the United States, in their struggle against prohibition. In 1921 he was an American representative to the conference on limitation of armaments.

ROOT, GEORGE FREDERICK (1820-1895), an American composer, born at Sheffield, Mass. He taught music in Boston and New York, studied a year in Paris and then returned

to America. During the Civil War period he made a fortune by publishing patriotic songs, most of them his own compositions. These include *Tramp, Tramp, Tramp the Boys are Marching*; *The Battle Cry of Freedom*; *Just Before the Battle, Mother and There's Music in the Air*. Among his more ambitious works are a *Te Deum*, *Belshazzar's Feast* and *The Pilgrim Fathers*.

ROOTS. The root is one of the three essential parts of a plant, the others being the stem and the leaves. Ordinarily roots grow downward into the soil, and when no descriptive term is given with the word means that part of the plant which grows in the ground and through which the plant obtains its nourishment from the soil. The root also holds the plant in position. Roots that spring directly from the embryo are called *primary*; those that spring from primary roots are called *secondary*. All the roots of a plant form its *root system*. The tiny rootlets, or *root hairs*, are the organs through which the plant draws water and nourishment from the soil.

In forms roots are *fibrous* or *fleshy*. The roots of corn, wheat and grass are good illustrations of fibrous roots. Turnips, beets and sweet potatoes are good illustrations of plants with fleshy roots. *Aerial* roots are those growing in the air, like roots developed by some orchids. Some plants, like the water hyacinth, have roots that live in the water. A *taproot* is the main root of a fibrous system, like the largest root of a tree. *Adventitious* roots spring from the stem and serve to brace the plant. Those in corn are a good example. See BOTANY, PLANT.

ROPE, a cord one or more inches in diameter. The distinction between rope and cordage is in size only, the term *cordage* being applied to sizes less than one inch in diameter. Hemp, jute, coir and cotton are the vegetable fibers most generally used for making ropes. Manila hemp, obtained from the Philippine Islands, is the most desirable, because of its strength. While cotton makes the strongest rope, it is too expensive for general use.

The process of manufacture is practically the same for all material, and most of the work is done by machinery. The hemp is received at the factory in bales. The fiber is first straightened and sprinkled with oil, then is passed through a machine called a *spreader*. From the spreader the hemp passes through a number of *breakers*, which straighten the

fibers and arrange them into a ribbon called the *sliver*. The sliver passes through another series of breakers, which prepare the fiber for spinning. As the fiber is spun, the yarn is wound on large bobbins. The yarn is then twisted into strands, and the strands into rope. Three strands are used in making a small rope, and a larger number for larger sizes.

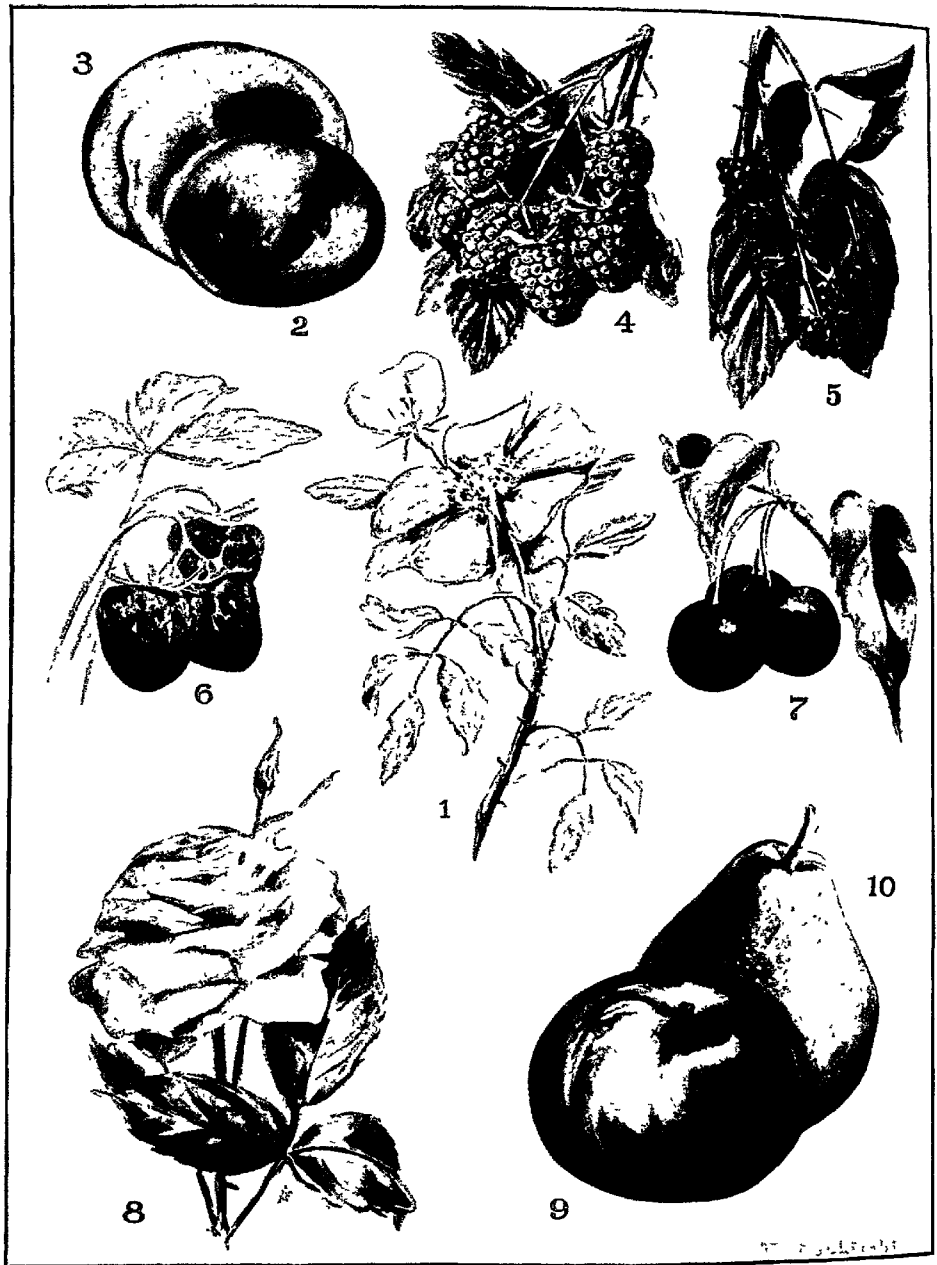
The strength of a rope depends upon its size and the material of which it is made. A hemp cord 1.53 inches in circumference will sustain a weight of 1,670 pounds; one 2.7 inches in diameter will withstand a strain of over 33,800 pounds.

Wire Rope. Wire ropes are made of wires twisted together, in the same manner as hemp is manipulated in making hemp ropes. Steel, iron or copper wire may be used, but steel is most generally employed, because of its greater strength and durability. Wire ropes are used for cables, in derricks and other hoisting machines, for rigging ships and for numerous other purposes.

ROB'QUAL, the name of the largest species of whales. The rorqual is distinguished from the *common*, or *right*, whale by having a dorsal fin and deep wrinkles on the throat. The head is comparatively small and flat, the body long and slender; the tail narrows before expanding into flukes. Rorquals are not as valuable as the right whale. See WHALE.

RO'SA, MONTE, mountain or group of mountains in the Pennine Alps, lying on the frontier of Switzerland, and second in altitude only to Mont Blanc, from which it is about fifty miles distant. It consists of eight summits, the highest being Dufourspitze, 15,217 feet. The mountain is covered with snow, and on one side is the great Gorner glacier. In 1904 an observatory was established on Monte Rosa at an altitude of 15,000 feet.

ROSACEAE, *ro za'se ee*, or the Rose family, one of the most important orders of flowering plants, containing about seventy-five genera and 1,200 species of herbs, shrubs, and trees. Most of these species live in cooler parts of the northern hemisphere, and many are of great value. The apple, pear, plum, cherry, peach, almond, nectarine, apricot, strawberry and the raspberry are all fruits of the rose family, and they vary greatly in structure. The leaves differ as much as the fruit, although the flowers have a characteristic appearance easily recognized



SOME MEMBERS OF THE ROSE FAMILY

1—Wild Rose 2—Plum 3—Peach 4—Blackberry 5—Raspberry 6—Strawberry
7—Cherry 8—Cultivated Rose 9—Apple 10—Pear

from their resemblance to the apple or strawberry blossom. Many of these fruits and flowers are separately described in these volumes under the names of specific species. See *Rose*.

ROS'AMOND, commonly called **FAIR ROSAMOND**, the mistress of Henry II of England. She died about 1176, soon after her connection with the king was openly avowed, and was buried in the church of Godstow Nunnery, from which Hugh of Lincoln caused her body to be removed in 1191. Almost all the stories related of Rosamond are legendary. The fable of the dagger and poison, with which the jealous Queen Eleanor is said to have sought out her rival, originated long after Rosamond had died.

ROSARIO, *ro sa'rio*, ARGENTINA, the second largest city in the republic, surpassed only by Buenos Aires. It is on the west bank of the Parana River, 170 miles northwest of Buenos Aires, in the southern part of the province of Santa Fé. It has rail communication with the interior provinces and with the Argentine capital, and is a busy river port. The city is well built, with wide streets, numerous parks and attractive homes. Modern electric street cars have been operated in Rosario since 1908. The city has prosperous flour mills, breweries and other manufactories, and the largest sugar refinery in the republic. There is a vast import and export trade, which is facilitated by modern docks, wharves, warehouses and other harbor accommodations. Rosario has, among other structures, handsome bank buildings, a courthouse covering an entire city block, fine public school buildings and a cathedral. Population, 1934, estimated, 500,000.

ROSARY, *ro'za ri*, in the Roman Catholic Church, a series of devotions consisting of a specified number of paternosters, aves and glorias arranged in groups. It begins with a paternoster (the Lord's prayer). This is followed by ten aves (salutations to the Virgin), and after these is a gloria (doxology). The ordinary rosary consists of fifteen of such groups. A string of beads, also called a rosary, is used to count the prayers. It ends in a pendant, to which is attached three beads and a crucifix. The beads, large and small, represent respectively paternosters and aves, and the crucifix stands for the Apostles' Creed. In reciting the aves the devotee meditates upon the various mysteries of the life of Christ—the joyful

mysteries (annunciation and nativity), the sorrowful mysteries (the passion), and the glorious mysteries (the resurrection and ascension).

The Greek, Armenian and other Eastern communities also use in their devotions a chaplet called a rosary.

ROSE, a genus of beautiful and fragrant flowers which has given its name to one of the largest botanical families, the *Rosaceae* (which see). Innumerable cultivated varieties of the rose have been developed, but in nature the rose plant is a thorny shrub with pinnate leaves. The shrubs vary in height from one to six or more feet, excepting those varieties that take the form of vines. The flower has five petals surrounding numerous stamens. The seeds are enclosed in a spherical receptacle, which when ripe forms a dry berry. The rose in its original form is seldom found except in an occasional old-fashioned garden and on the prairie. Roses cultivated for their flowers have been developed from the wild species by changing the stamens into petals.

Among the most common of the garden roses are the *pink cabbage*, or *Provence*, rose, a very old variety of Eastern origin; the *Cherokee rose*, a native of China, with single, large, pure white flowers; the old-fashioned sweet-scented *cinnamon rose*, from Europe; the *pink damask roses*, from Damascus; the *climbing evergreen rose*, of Southern Europe, with its shining leaves and brilliant flowers; the *Scotch roses*, which are of dwarf stature, but very hardy, producing early in the summer an abundant crop of red, white or yellow flowers; the common *white rose*, from the Caucasus, the common *yellow rose*, from Asia Minor, often called the Austrian brier, or yellow eglantine; the *Bengal*, or *monthly*, rose, a hardy, perpetual bloomer, with a profusion of brilliant flowers, and the *Queen of the Prairie* and *Baltimore Belle*, cultivated varieties of the wild prairie rose. In the wonderful climate of Cannes, France, the



THE ROSE

Riviera, Italy, and Southern California, roses grow in a beauty and profusion that can scarcely be conceived by one who has never visited these places. There are bowers of roses, hedges of roses, and cottages and even public buildings are almost hidden by them. Among the principal greenhouse varieties are the *American Beauty*, dark red; the *bride*, white; the *bridesmaid*, pink; the *pearl of the garden*, yellow; the *liberty*, crimson and the *Ulrich Brunner*, cherry red.

In the language of flowers, the red or white rose stands for love and the yellow rose for jealousy. The rose is the national flower of England and Persia, and the state flower of New York and Iowa. Portland, Ore., is known as the "Rose City", and a carnival of roses is held there on some day in June, every year. The tournament of roses held every New Year's Day in Pasadena, California, has become one of the most gorgeous flower spectacles in the world.

Rose growing in hotheouses has become a very important industry in the United States and has been brought to a remarkable degree of perfection. Every good greenhouse has its rose house, where the plants are given the tenderest care. They require a stiff pasture loam, careful fertilization, good drainage and plenty of ventilation. Different varieties, however, require such different treatment that the florist must know thoroughly the nature of each individual plant. For the sake of convenience, the florists and botanists divide all cultivated roses into two classes—summer, or once-blooming, roses, and autumnal, or ever-blooming, roses.

ROSEBERY, *roz'ber ry*, ARCHIBALD PHILIP PRIMROSE, Earl of (1847–1929), an English statesman, educated at Eton and Oxford. In 1868 he succeeded to the earldom and entered the House of Lords. He was under-secretary at the home office from 1881 to 1883, lord privy seal and first commissioner of works in 1885, and in the next year he held the secretaryship of foreign affairs, till the fall of the Gladstone government. In 1889 he became a member of the London County Council and was appointed chairman of that body. In 1892 he became Secretary of State for Foreign Affairs under Gladstone, and in 1894 he succeeded Gladstone as Premier, holding office, however, little more than a year. Early in his career he won the favor of the masses by advocating measures for bettering the conditions of the working

people. He is the author of *William Pitt, Appreciations and Addresses*, *Sir Robert Peel*, *Napoleon*, *Cromwell* and *Chatham*.

ROSECRANS, *ro'ze krans*, WILLIAM STARKE (1819–1898), an American general, born at Kingston, Ohio. He graduated at West Point in 1842 and was employed there for a time as assistant professor. In 1854 he resigned from the army and became a civil engineer, but when the Civil War broke out he volunteered as aide to General McClellan.

When McClellan was appointed commander of the Army of the Potomac Rosecrans was given the rank of brigadier-general and placed in command of the forces in Western Virginia. In 1862, after the evacuation of Corinth by the Confederates, he was given command of the army in Mississippi and successfully defended the city against Price and Van Dorn. Later he commanded the Department of the Cumberland. He defeated the Confederates under Bragg in the Battle of Murfreesboro, but at Chickamauga was defeated by Bragg, with great loss. He was succeeded by General Thomas and later was relieved of his commission. At the close of the war he resigned from the army.



ROSECRANS

ROSEMARY, *roz'e ma ry*, an evergreen aromatic shrub of the mint family, a native of Southern Europe. It grows from four to eight feet high, has dark green leaves, with a white under surface, and pale blue flowers in graceful sprays. Rosemary yields, by distillation, an oil used in making perfumes and aromatic waters. The rosemary is an emblem of remembrance and fidelity. *American rosemary*, found on the Atlantic coasts, belongs to the leadwort family.

ROSE OF JERICHO. See JERICHO ROSE.

ROSES, **WARS OF THE**, the name given to the struggle for the throne of England between the House of Lancaster and the House of York. The emblem of the House of Lancaster was a red rose and that of the House of York a white rose, hence the name of the conflict. The war began in 1455 with the Battle of Saint Albans, and lasted, with short

intervals of peace, for thirty years, ending with the Battle of Bosworth in 1485.

At the beginning of the struggle, Henry VI, a Lancastrian, was on the throne. His chief opponent was Richard, Duke of York. During the struggle Henry was deposed, then reinstated and deposed a second time, while the head of the Yorkist faction, Edward IV, managed to hold the throne, with the exception of a short interval, from 1461 to 1483. After the accession of Richard III, a rising occurred under the Duke of Richmond, who drove Richard from the throne and himself was crowned king as Henry VII. He married Elizabeth, daughter of Edward IV, and thus united the two factions.

ROSETTA STONE, a tablet of black basalt found near Rosetta, Egypt, by a French engineer in 1799, and now in the British Museum. The tablet contains identical inscriptions in ancient Egyptian hieroglyphics, in Demotic, a modified form of the Egyptian writing, and in Greek. By comparing the Egyptian characters with the Greek a clue to these ancient writings was found, so the Rosetta stone is considered to be the key to the ancient Egyptian hieroglyphics. The inscription on the stone was in honor of Ptolemy V, Epiphanes, and was made in 195 B C. See **HIEROGLYPHICS**.

ROSE WINDOW, a circular window, divided into compartments by mullions and tracery radiating from a center, also called *Gutharne wheel* and *marigold window*, according to the modifications of the design. It forms a fine feature in the church architecture of the thirteenth and fourteenth centuries, and it is mostly employed in the triangular spaces of gables. In France it is much used, and notwithstanding difficulties of construction, it has attained great size. Fine examples are to be seen in the cathedrals of Paris, Rheims, and Amiens. During the World War a number of these windows, which were exquisite works of art, were destroyed.

ROSEWOOD, the name of several varieties of wood used in making musical instruments and ornamental furniture. The rosewoods are usually of a deep rose color, marked with dark lines, which under polishing becomes almost black. The woods are used in veneering furniture and in making the cases of pianos and other musical instruments. The best wood is obtained from Brazil, the East Indies and Africa. The odor

of rosewood is noticeably like that of roses, and from this fact the name is derived.

ROSIN, *roz'in*, the resin of cone-bearing trees, especially pitch pine, from which it may exude in small quantities. The resin of commerce is prepared by distilling turpentine. The resin remains in the tank, and the turpentine passes over. Rosin is brittle and of yellowish-brown color, and it has a characteristic odor, but is practically tasteless. It is used in the manufacture of sealing wax, varnish, cement and soap; for soldering, and in the manufacture of various kinds of plaster and cement. See **RESINS**, **TURPENTINE**.

ROSS, ALEXANDER (1783-1856), a Canadian pioneer and author. He went to Canada from Scotland in 1805, joined Astor's expedition to Oregon in 1810 and was afterward a fur trader in the Hudson Bay Company's service. He is the author of *Adventures of the First Settlers on the Oregon, The Fur Hunters of the Far West* and *The Red River Settlement*.

ROSS, BETSY (1752-1836), a Philadelphia seamstress who became famous in American history as the maker of the first United States flag. In June, 1777, a committee from Congress, headed by General Washington, came to her house at 239 Arch Street to commission her to make a flag according to a design adopted by Congress on June 14. The flag Mrs. Ross made had thirteen stars arranged in a circle on a blue ground, and thirteen stripes, alternate red and white. It was so much admired that the government made a contract with her to make all the flags, and it engaged the daughter of Mrs. Ross to continue the work long after her mother's death. The house on Arch Street is preserved as a memorial of the famous seamstress.

ROSS, JAMES CLARK, Sir (1800-1862), an Arctic and Antarctic explorer, born in London. He entered the British navy at the age of twelve, accompanied his uncle, Sir John Ross, on his two voyages in search of a northwest passage and in the interval between them accompanied Captain Parry in four Arctic voyages. He was promoted to the rank of post captain in 1834, particularly for the determination of the position of the north magnetic pole. He commanded the expedition of the *Erebus* and *Terror* to Antarctic regions (1839-1843), and discovered Victoria Land and several islands. He attained latitude 78° 10' S., a record which was not broken until 1900. His published narra-

tive of this voyage was a valuable contribution to geographic and scientific knowledge. He was knighted for his services. In 1848 he made an unsuccessful expedition to Baffin's Bay, in search of Sir John Franklin. In 1856 he was made rear-admiral. See NORTH POLAR EXPLORATION; SOUTH POLAR EXPLORATION.

ROSSETTI, CHRISTINA GEORGINA (1830-1894), an English poet, the sister of Dante Gabriel Rossetti, was born in London, and educated at home. Her main interests were religion and poetry, and she lived a quiet, retiring life, devoting her time to literary pursuits. Many of her best poems are distinctly religious in tone, but they are also noteworthy for their revelation of the beauty in the world. Critics agree in ranking her next to Elizabeth Barrett Browning among the English women writers of the nineteenth century. *Goblin Market and Other Poems*, *The Prince's Progress and Other Poems* and *A Pageant and Other Poems* contain most of her works. *Up Hill* is probably her most popular poem.

ROSSETTI, GABRIEL CHARLES DANTE (1828-1882), better known as Dante Gabriel, an English painter and poet, born in London, the son of an Italian patriot, who was a refugee in England and a professor in Oxford. He early showed a genius for art, studied in the Royal Academy and later became a pupil of Ford Madox Brown. His intensity of feeling in both painting and poetry gathered around him a small group of painters, among whom were Holman Hunt, Thomas Woolner, Millais and others, who founded the so-called *Pre-Raphaelite Brotherhood*, with Rossetti as their leader. This group advocated a return to the purity and idealism of the old masters before Raphael, and their effort was to ennoble art and to give their work sincerity. Other painters who have continued the practice of these principles are called *Pre-Raphaelites* (which see). In 1849 Rossetti exhibited his painting of the *Girlhood of Mary Virgin*; but his later works, numerous as they were, were rarely seen by the public until the posthumous exhibition of a collection of his paintings in 1893 at the Royal Academy. His principal paintings are *Dante's Dream*, *Salutation of Beatrice*, *Dying Beatrice*, *La Pia*, *Proserpine*, *Sibylla Palmifera*, *Monna Vanna*, and *Venus Verticordia*. In most of his pictures he has represented the face of his wife,

to whom he was very devoted. His subjects are generally religious or mystical and reveal wonderful imaginative sentiment and wealth of color.

As a poet Rossetti takes high rank. At the age of twenty he wrote his most famous poem, *The Blessed Damosel*, a rare combination of simplicity and spirituality. It is considered to represent the aims and ideals of the *Pre-Raphaelite School*, both in literature and art. *My Sister's Sleep*, another of his early poems, is also of rare merit. Besides these, *The House of Life*, *The King's Tragedy and Other Ballads*, and *Dante at Verona* include most of his poems. In 1861 he published *The Early Italian Poets*, a series of translations afterwards reissued under the title of *Dante and His Circle*.

ROSSINI, rohs s'ne, GIOACHINO ANTONIO (1792-1868), an Italian composer born at Pesaro. He wrote many comic and serious operas, all of those by which he is most widely known appearing before he was thirty years old. The best known of his operas are *The Barber of Seville*, *Othello*, *William Tell*, *Semiramide*, *Ermione*, *Moses in Egypt* and *Lady of the Lake*. Perhaps his most famous work is *Stabat Mater*. Before he had reached middle life, Rossini had become one of the best-known composers of his day, but his indolence and vanity caused his popularity to wane rapidly. He resided at different times in London, Paris, Naples, Florence and Bologna, and died in comparative obscurity.

ROSTAND, rohs tah'N', EDMOND (1869-1918), a French dramatist and poet, and author of a celebrated play *Cyrano de Bergerac*, was born at Marseilles. He was the son of a great journalist, and his early writings showed his skill and ability. His first play, a comedy, was produced in Paris in 1894, and was very successful. *Cyrano* was translated into English and several other languages, and was produced in the leading cities of Europe and America. His next famous play was *Chantecler*, a fantasy of bird and animal life, which was eminently successful. Rostand was elected a member of the French Academy in 1902.

ROSWELL, rahs'wel, N. M., the county seat of Chaves County, 230 miles northeast of El Paso, on the Pecos, Berrendo, Spring and Hondo rivers, and on the Atchison, Topeka & Santa Fé Railroad, built to the city in 1900. There is a Carnegie Library, a courthouse, a Federal building, a hospital and

the New Mexico Military Institute. The surrounding country is a farming and stock-raising section. Roswell is governed on the city manager plan. There is a complete airport. Population, 1930, 11,173.

ROT, a disease afflicting sheep and occasionally other domestic animals. It is caused by the presence in the gall bladder of a parasite known as the liver fluke, which is developed from germs swallowed by the animals with their food. The average length of the fluke is about one inch. Several dozen of these parasites may sometimes be found in the liver of a single sheep. Damp atmosphere or damp soil or fodder promotes the disease, which in almost all cases proves fatal.

ROTATION OF CROPS, the practice in agriculture and horticulture of growing different crops on the same piece of land in succeeding years. The plant foods found in the soil—nitrogen, phosphorus and potash—occur in varying proportions in different soils. Some plants require more of one of these foods than others, and if the same plant is raised on the land year after year, at least one of these foods will become exhausted to such an extent that the plant will not receive sufficient nourishment to produce a good crop. Moreover, if the same crop is grown continually on the same ground, diseases and insect pests increase from season to season. Rust and cinch bugs destroy wheat, but if a crop of wheat is followed by one of corn or clover, these pests disappear because there is nothing for them to feed upon. Such crops as wheat, oats and barley, that do not admit of tillage, allow weeds to multiply rapidly. If such a crop is followed by corn or some other crop that admits of tillage for several weeks, most of the weeds are killed.

From the above illustration it is evident that rotation of crops is necessary because—

1. It is one of the best means of maintaining the fertility of the soil
- 2 It is a check upon plant diseases and insect pests
- 3 It enables the farmer to check the growth of weeds.

Systems of Rotation. Many systems of crop rotation have been advocated, and all contain certain underlying principles that the farmer should understand. However, no system can be applied successfully to any large area, because in planning crop rotation the farmer must consider chiefly local conditions, such as the nature and fertility of his soil, the

adaptation of climatic conditions to the crops under consideration, the probability of marketing his crop at a profit, and the economy of labor connected with raising the various crops. All systems include grain crops, grass crops and cultivated crops, with at least one application of manure during the series.

The following five-years' rotation yields good results in many localities: First year, corn, following an application of eight tons of manure per acre; second year, wheat; third and fourth years, grass (timothy and clover); fifth year, oats.

School Work in Rotation of Crops. The subject of agriculture in the public schools is one to which more and more importance is attached every year. In some counties each teacher is furnished with a tentative course in agriculture for all grades, and while it is not compulsory usually to follow such an outline, it is always strongly recommended.

If in any school there is sufficient interest in the matter and enough time can be given to it, a form of work in agriculture after the following outline may well be adopted.

A field seventy-two feet by one hundred eight feet, not counting spaces for walks, should be provided. A diagram of such a plot is presented below. Many such diagrams, varying only slightly, have been recommended; the one chosen has the merits of the best of these. Modification to suit local needs and conditions may be adopted

10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45

DIAGRAM OF EXPERIMENTAL FIELD

Every boundary line should be a grass or gravel walk three feet wide. Every square should be eighteen by eighteen feet. Before harvesting a crop on any square each plot or square should be cut down to the dimensions of the square rod for purposes of easy computation and record. Having determined the yield in one square rod, mul-

tively by 160 to determine the yield per acre. On such a plot it is possible to study with excellent results rotation of crops.

Rotations should be conducted as follows:

Plots 10, 11, 12, 13, 14, 15—Continuous corn crops.

Plots 20, 21, 22, 23, 24, 25—Corn and oats rotation.

Plots 30, 31, 32, 33, 34, 35—Corn, oats and clover rotation.

Plots 40, 41, 42, 43, 44, 45—Corn, oats, clover and wheat rotation.

The experiments in the value of standard fertilizers could be tested in this way:

Plots 10, 20, 30 40—Nothing.

Plots 11, 21, 31, 41—Apply manure.

Plots 12, 22, 32, 42—Manure and lime.

Plots 13, 23, 33, 43—Manure, lime and phosphorus.

Plots 14, 24, 34, 44—Manure, lime, phosphorus and potassium.

Plots 15, 25, 35, 45—Nothing, and, in addition, permit no vegetable matter to decay. Remove it.

All work can be done with hands and primitive tools. These experiments can be directed upon about thirty-five square rods or about one-fifth of an acre. This small tract of land will answer the same questions, in the same way, as the larger fields. The agricultural college in your province will doubtless be very glad to cooperate with you in connection with your experiments along the above lines. See SOIL.

ROTHSCHILD, *rots'shilt* or *roths'child*, a famous family of financiers and bankers.

Mayer Anselm Rothschild (1743-1812), the founder of the family, was born in Frankfort-on-the-Main. He proved most successful in his management of the fortune of the elector of Hesse-Cassel, and his family was given the patronage of the elector. All five of the sons of Mayer Anselm were made barons by the emperor of Austria. These five sons founded banking establishments in five of the large cities of Europe and established agencies at other places, both in Europe and in America.

Lionel Rothschild (1808-1879), a grandson of the first Mayer Anselm, was born in London and became the head of the London house of Rothschild. He was several times elected to Parliament, but each time he was refused the right to take his seat, because he declared he could not conscientiously repeat the last words of the oath—"on the true

faith of a Christian." He virtually brought about Jewish emancipation in England.

Nathan Mayer Rothschild (1840-1913), the first Lord Rothschild, was raised to the peerage in 1885, and was the first of his race upon whom the honor was conferred. The various banking houses are still carried on by descendants of the Rothschild brothers.

ROTTERDAM, NETHERLANDS, the chief commercial port and the second largest city of the country, is in the province of South Holland, on the Meuse River, about fifteen miles southeast of The Hague and forty-four miles southwest of Amsterdam. The city is divided into two parts by High Street. The old quarter is filled with quaint wooden buildings, while the new part is laid out with wide, well-kept streets, lined with substantial buildings. The principal buildings are the Saint Lawrence, a fifteenth-century church in the Gothic style, the exchange, the town-hall, the courthouse and the postoffice. North of the city is the large zoölogical and botanical garden, and west of the city is a beautiful park.

Shipbuilding constitutes the principal industry of Rotterdam, but others of importance are the manufacture of cigars, spirits, paints, chemicals and sugar. A thriving trade in butter, cheese, linen and flax is carried on. Rotterdam has a great system of docks and harbors, and the location of the city makes it an important center of maritime trade. The chief imports through Rotterdam are grain, ores, metals, coffee, tea, oil, tobacco and cigars. The same articles are reshipped for export, along with lumber and some animal products. Population, 1934, 587,901.

ROUBAIX, *roo bay'*, FRANCE, a city in the department of Nord, situated seven miles northeast of Lille, important as a center of the manufacture of textiles and also as the seat of the National School of Industrial Arts. The city was captured by the Germans in 1914, remaining under martial law until the German retreat from the Lille region. Population, 1931, 117,190.

ROUEN, *roo ahN'*, FRANCE, situated on the Seine, eighty-four miles northwest of Paris and fifty-six miles east southeast of Havre. The town is characterized by crooked, though picturesque, streets, and old houses, with quaint gables and carved timbers. Many specimens of medieval architecture have been retained, though in the newer part of the town the old streets and buildings have given

way to broad boulevards and modern structures. The city contains the finest Gothic cathedral in France; the Church of Saint Ouen is also worthy of note. Other buildings of note are the Palais de Justice, the Hotel de Ville, which contains the public library, and the archbishop's residence. There are in the city also a number of museums of antiquities and art collections of great value. In the Place du Vieux Marché, Joan of Arc was burned at the stake, in 1431, and a monument to her memory stands upon the spot.

Rouen has extensive docks, third most important in the country, and is a commercial and industrial center. The leading industries are cotton spinning and the manufacture of coarse cotton goods, called *rouenneries*. Following this in importance are the manufactures of silk, chemicals, soap, machinery and foundry products and the refining of sugar. The city became an important post under the Romans and was formerly the capital of Normandy. It was captured from King John of England by Philip Augustus in 1204, but was returned to the English thirty years later. From 1419 to 1449 it was in possession of the English, from whom it was taken by the French under Charles VII. Population, 1931, 122,957.

ROUGE, *roozh*, a very fine scarlet powder, used by jewelers for polishing purposes and prepared from crystals of sulphate of iron, exposed to a high temperature. The name is also given to a cosmetic used in coloring the cheeks. See **SAFFLOWER**.

ROUGE-ET-NOIR, *roozh a nwahr*, (French, "red and black") or **TRENTE-UN** (*thirty-one*) or **TRENTE ET QUARANTE** (*thirty and forty*), a modern gambling game played with the cards belonging to six complete packs. The players are arranged about a table covered with green cloth, on which is a diagram showing four spaces, upon which money may be placed as a bet, namely, *rouge*, *noir*, *couleur* and *inverse*. The banker then deals a row of cards for *noir*, until the exposed spots number between 30 and 40 (face cards count 10, aces 1), and a similar row for *rouge*. The row wins which most nearly approaches the number 31, and players staking on the winning color receive their stake doubled. *Couleur* wins if the first card turned up in the deal is of the winning color; in the contrary case *inverse* wins. When the number of spots in both rows are equal it is a *refant*, or tie, and a fresh deal is made;

but if both happen to count exactly 31 the banker claims one-half of all stakes. This last condition places the bankers at an advantage, calculated to be equal to about 1¼ per cent on all sums staked.

ROUGET DE LISLE, *roo zha' de leel*, CLAUDE JOSEPH (1760-1836), a French poet and composer, author of the *Marseillaise*, the national anthem of France. He was born at Lons-le-Saunier. In the army he rose to the rank of captain of engineers, but was twice suspended because he would not sanction the violent measures of the Revolutionary party. He was pensioned by Louis Philippe, and devoted his last years to music and poetry. In 1915 his body was placed with impressive ceremony in the Hôtel des Invalides, Paris. See **MARSEILLAISE**.

ROUGH RIDERS, the name given to the first regiment of United States volunteer cavalry in the Spanish-American War. It was organized by Theodore Roosevelt, who resigned his position as first assistant Secretary of the Navy to become lieutenant-colonel. The regiment was composed largely of cowboys. It won particular distinction at the battles of El Caney and San Juan. In 1899 a patriotic hereditary society was organized, to which members of the Rough Riders and their eldest sons, were admitted. See **ROOSEVELT, THEODORE**.

ROULETTE, *roo let'*, a game of chance, first played in the gambling rooms of Monte Carlo. The roulette (little wheel) lies in the center of a table covered with green cloth. This cloth is divided by lines radiating from the center of the wheel, and the spaces are marked *passe*, *pair*, *manque*, *impair*. There are also two diamond-shaped spaces, colored respectively red and black. The wheel has thirty-seven compartments—one marked *zero*, the rest numbered consecutively. *Manque* indicates numbers from one to eighteen, inclusive; *passe*, all numbers above that. *Pair* means even numbers; *impair*, uneven. An attendant, called a *croupier*, starts the wheel revolving, the bettors stake their money, and a small ivory ball is thrown off by the motion of the wheel into one of the numbered compartments.

ROUMANIA. See **RUMANIA**.

ROUNDHEADS, the name applied in derision to the members of the Puritan, or Cromwell, faction by the adherents of Charles I, at the outbreak of the Civil war in England in 1642. The members of the

Parliamentary, or Cromwell faction, were distinguished by having their hair closely cut. The adherents of Charles, who styled themselves *Cavaliers*, wore their hair in long ringlets.

ROUND TABLE, in the legends of King Arthur, the circular table about which the knights of his court took their seats, and, in consequence, the fraternity of knights itself. Each seat at Arthur's table bore the name of the knight to whom it was assigned. One called the Siege Perilous, was reserved for him who should prove worthy of the quest of the Holy Grail. The round table has been immortalized in song and story, the most famous piece of literature founded upon the legend being Tennyson's *Idylls of the King*.

ROUND TOWERS, a class of circular stone towers erected in the Middle Ages. Examples are found in Ireland, Scotland and Central Europe. They are from twenty to thirty feet in diameter, and from sixty to 130 feet high. The doors, from six to twenty feet from the ground, are reached by means of ladders; ladders also serve as stairs from floor to floor. The top story has four windows; each of the remaining stories has one window. These towers are thought to be the work of an early Christianized race who erected them as places of refuge and as watch-towers. They date from a period extending from the eighth or ninth to the thirteenth century.

ROUSSEAU, *roo so'*, JEAN JACQUES (1712-1778), the man of whom Lord Morley said, "His message gave Europe a new gospel," and of whom Napoleon said, "Without him the French Revolution would never have occurred." Rousseau was one of the most brilliant and influential French writers of the eighteenth century. But little is known of his early life, except that in his boyhood he was apprenticed to an engraver, from whom he ran away. He then fell under the care and influence of Madame de Warens, who sent him to a Catholic school. After leaving the institution he wan-



JEAN JACQUES
ROUSSEAU

dered aimlessly about Europe for a time, then returned to Madame de Warens, spending three years with her in her country home.

In 1741 Rousseau went to Paris, and in 1743 obtained the position of secretary to the French ambassador at Venice. He resigned in 1745 and returned to Paris, where he led a precarious life, copying music and studying science. In 1750 an essay, in which he adopted the negative side of the question whether civilization has tended to purify morals, won a prize offered by the Academy of Dijon. This for the first time brought Rousseau into general notice, and was the turning point in his career. He then began to study the philosophy of government and the social conditions of the country. During the next fifteen years he produced works which revolutionized the thought of the continent. The most noted of these are *Discourses on Inequality*; *Julie, or the New Heloise*; *The Social Contract*; and *Emile*, a treatise on education. An account of his life is given in his *Confessions*, a work of twelve volumes. *Emile* is the work by which Rousseau is most widely known at the present time. Many of the principles adopted by Pestalozzi and Froebel were taken from this work, and it may be said to have laid the foundation of modern education.

"Rousseau was a man of marked contrasts," a character, says one observer, "in whom probably beyond all others, is to be found the greatest mixture of strength and weakness, of truth and falsity, of that which is attractive and that which is detestable." An opponent of the thought and tendencies of his time, he wrote with such force as to attract the attention and change the convictions not only of France, but of Europe.

ROWING, *ro'ing*, the art of propelling a boat over the water with oars. The oar was probably used before the sail. At all events, boats propelled by oars, with rudders for steering, were in use more than 3,000 years before Christ, and the ancient Greeks and Romans traveled in great galleys with rows of oars, one above another manned by slaves.

Rowing as a sport was not recognized until early in the eighteenth century. The first boat race on record occurred in 1715, and amateur rowing as it is known to-day began in England, in 1800. The first boat race between Oxford and Cambridge universities took place in 1829, and since 1856 the con-

test has been an annual event, except during the World War. Most English boat races are on the Thames, which has always been the favorite resort of amateur oarsmen. The most important English regatta is held annually at Henley, on the Thames. In the United States the most important regattas are at Poughkeepsie, on the Hudson River.

Harvard, Yale, Cornell, and California universities have led in regattas in the United States, and the annual boat races between the crews of these universities are followed with great interest throughout the country. The first American races took place in 1843 and 1844, and ten years later the first amateur boat club was organized. The National Association of Amateur Oarsmen was formed in 1873. Occasional international regattas have been held between English and American oarsmen.

Boats used in racing are long, narrow and light. Their walls are so thin that the boats are called *shells*. They are built for one, two, four, six or eight men. The best shells have movable seats.

ROWLAND, *ro'land*, HENRY AUGUSTUS (1848-1901), a distinguished scientist, born at Honesdale, Pa., and educated at Rensselaer Polytechnic Institute at Troy, N. Y. He was elected professor of physics in Johns Hopkins University in 1876 and held the position until his death. During his travels in Europe he studied the methods of instruction in different educational institutions and carried on extensive scientific research. To Professor Rowland is due, in great measure, the world-wide reputation of Johns Hopkins University as a great scientific school. Rowland became widely known through his inventions and discoveries in science. He was the originator of the multiple telegraph instrument and also succeeded in making the most perfect photographs of the solar spectrum, that have been secured.

ROYAL GORGE, *gorj*, a famous canyon through which the Arkansas River flows, in Fremont County, Central Colorado. It is eight miles long, and is one of the most picturesque gorges in America. The walls, which rise to a height of about 3,000 feet, are gorgeously colored. See **ENGINEERING**.

ROYAL INSTITUTION OF GREAT BRITAIN, an organization founded in London by Count Rumford in 1799 "for the promotion, diffusion and extension of science and useful knowledge." Its original pur-

pose was to give the laboring classes information in physics and mechanics, by means of lectures. However, lecturers of such note were engaged that all classes of students were attracted to them. The members are elected by ballot and pay an admission fee and an annual subscription.

The buildings include a library, a laboratory and a museum. In the laboratories some of the most valuable discoveries in chemistry and physics have been made. On the list of lecturers are the names of Huxley, Tyndall and Gladstone.

ROYAL CANADIAN MOUNTED POLICE, the police force of the Canadian Northwest, known throughout Canada as the "mounties." The force was organized in the autumn of 1873, by an act of Parliament, for the purpose of assisting in governing the vast unsettled territory which had been ceded by the Hudson's Bay Company to the Dominion of Canada. The act which established the force provided that all the police were to be mounted and efficiently equipped, but without any finery. "As little gold lace and fuss and feathers as possible" was the motto of Sir John Macdonald. No person was to be appointed to the force "unless he be of sound constitution, able to ride, active and able-bodied, of good character, and between the ages of eighteen and forty years; nor unless he be able to read and write the English or French language." The Canadian Mounted Police was to be a civil force, with military discipline and police powers.

From the very beginning it attracted high grade men. University graduates and noblemen have served in the ranks with the humblest. Another important characteristic of the men of the force is that they think for themselves. In the course of a patrol a sergeant may find himself called on to act in almost any capacity. He must be a man capable of meeting emergencies as they arise. Consequently the Canadian Mounted Police has always been a self-reliant, yet well-disciplined, body of men.

Duties. There is hardly a department of Canadian government that is not assisted by these hardy troopers. They act as customs officials along the border. They carry the mails to distant mining camps, they report on the roads, bridges, crops and weather, and they take the census. They help travelers, and they are frequently called on to care for the sick.

Probably the most important duty of the police is to enforce law and order. In many of the remote districts they not only preserve the law, but make it and interpret it. The officers make regular trips throughout their districts to hold court. In tracking down criminals these men have many difficulties. It might seem that in the north, especially in winter, it would be almost impossible to detect a crime and punish the criminal. The records of the police prove the contrary. No detective force in the world can show a better record. No matter how small the crime, "Get the man," is the order. The murderer and the sneak thief are both criminals; though their punishment is different, both must be punished. Time and distance are no object. This attitude, absolute justice to every man, has earned for the mounted police the fear of all evil-doers and the respect and admiration of all good citizens.

Present Organization. The "Royal Canadian Mounted" was intended originally to police the vast, sparsely inhabited West and Northwest of the Dominion. The scope of its operations has been extended from time to time until now its units are stationed from coast to coast, and include a Marine Section on each ocean. During the World War when several hundred of its members joined the colors for service abroad, it was necessary to withdraw from mounted policing the provinces of Alberta and Saskatchewan, but resumption followed the coming of peace. Thus throughout the width of a vast continent there is a single closely organized unit devoted to law and order, working independently but in coöperation with local constabulary.

The extent of the Western territory alone that is covered by the Mounted Police is amazing. The Yukon and North West Territories constitute an area exceeding 1,500,000 square miles. The most remote stations are in regions far beyond the Arctic Circle. The force numbers about 2,600 men in all ranks.

ROYAL SOCIETY, THE, a scientific society in Great Britain, the most famous and influential scientific society in the world. In 1664 it began the publication of *Philosophical Transactions*, since 1750 published annually and containing the most valuable record of scientific developments in existence. Important scientific commissions which have been entrusted by the British government to the Royal Society have in-

cluded the direction of the Royal Observatory at Greenwich by Isaac Newton in 1671, the correcting of the calendar in 1752, the protection of British ships from lightning, the measurement of a degree of latitude, the Antarctic expedition under Captain Cook in 1772, the Arctic expeditions under Parry in 1819, Sir John Franklin in 1845 and Nares in 1874, the determination of the density of the earth, the accurate comparison of systems of weights and measures and many other similar undertakings. Several trust funds and a library of 50,000 volumes are in the hands of the Society.

Admission to the Royal Society is difficult to secure, and the F. R. S. (Fellow of the Royal Society), which its members are allowed to write after their names, is a sign of great distinction. Fifteen new members may be admitted each year, and there may be representatives of other countries than Great Britain on the roll to the number of fifty.

RUBAIYAT, *roo bai'yat*. See OMAR KHAYYAM

RUBBER AND RUBBER MANUFACTURE. Rubber is an elastic gum made from the milky juice of a number of plants which grow in the tropical and semitropical regions of the world. The juice resembles the milk-white sap of the milkweed, and it is now known that plants of the milkweed family contain a small quantity of rubber.

How Rubber is Obtained. The hevea tree, which is found in large numbers in the forests of the Amazon, is yet the chief source of the world's rubber. The work is done by Indians. The sap, or latex, as it is called, comes from the inner layer of bark, and the tree is gashed just deep enough to reach this layer. The tool used resembles an ordinary hatchet. First a vertical gash, or channel, is made. Then slanting gashes connecting with this are made on one or both sides. The latex flows down these cuts to the main channel, and a cup is placed at its bottom to catch the fluid. The tapping is done early in the morning, and the latex is gathered a few hours later.

Making the Rubber. A pail of latex looks very much like a pail of milk, and if allowed to stand the rubber will rise to the surface like cream. But the water must be evaporated and the rubber coagulated at once, or the rubber will be injured. The Indian makes a small fire of sticks and palm



TYPICAL SCENES ON A CEYLON RUBBER PLANTATION

Latex flowing from a rubber tree Making new incision to accelerate the flow of sap The lower picture is that of a receiving room for sap collected from the trees



RECENT DEVELOPMENTS IN THE RUBBER INDUSTRY

Above: bud grafting on rubber trees in Sumatra. Below: a California field of guayule; harvested after growing four years, it yields a good quality of latex.

nuts, over which he places a clay cone having a small opening at the top through which the smoke escapes. He dips a wooden paddle into the latex and holds it in the smoke until the water is evaporated, leaving a thin coating of rubber. The paddle is again and again dipped into the latex and held in the smoke until a ball of rubber so large that it cannot be handled is formed. This ball, called a *biscuit*, is then cut open on one side, and the paddle is taken out. The biscuit is the form in which the crude rubber is placed on the market.

Today, wild rubber trees are giving way to well-organized plantations. Besides the Brazilian supply, rubber is produced in India, the Malay Peninsula, Ceylon, Central Africa, and Latin America. The guayule tree, a rubber source, has been the object of experimentation in California and Florida. An American rubber company (Firestone) is developing trees in Liberia, another (Ford) is acquiring a great plantation in Brazil.

Rubber Manufacture. When the crude rubber reaches the factory it is run through a washing machine, consisting of a pair of toothed rollers over which water is flowing. The rollers break the rubber up into rough strips, and the water removes dirt and other impurities. The strips of rubber are dried and sent to the mixers, where sulphur and various other substances are mixed with it, to prepare it for the purposes for which it is to be used. Sulphur is the most universally used of all compounds; some of the other substances commonly employed are alummite, asbestos, zinc oxide, white lead, whiting, china clay, mica and talc. It is at this stage of the manufacture that old rubber reclaimed from overshoes and other discarded rubber articles, is used. From the mixing machine the rubber goes to calenders, or rollers, from which it comes in sheets ready for use.

At no stage of the process is rubber melted. It may be warmed at times, but molded solid rubber goods are pressed into molds, not poured in. For rubber shoes, clothing, belting, hose, tires, etc., the rubber is combined with duck or some other strong fabric. This is done by laying a sheet of rubber on the fabric and pressing the two together between heavy rollers. Cloth for mackintoshes is prepared by laying a thin sheet of rubber between two layers of cloth and pressing them together. Tubing is made by pressing soft rubber through a mold. Rubber bands sold

by stationers are cut from pure rubber hose.

Vulcanizing. Previous to 1839, rubber was considered of little commercial value, because no method of preparing it for practical use had been discovered, and all articles made from it were sticky in warm weather, and hard and brittle in cold weather. In 1839 Charles Goodyear, an American, discovered the process upon which the modern rubber industry largely depends. Goodyear found that by mixing sulphur with rubber and heating it its objectionable features were removed. The process is known as *vulcanizing*, because Vulcan was the ancients' god of fire. The term is now commonly applied to the process of repairing punctures in automobile tires. See GOODYEAR, CHARLES.

Commercial Importance. If we were to enumerate all the articles made of rubber or those into whose manufacture rubber enters, the list would be long. Without rubber, we could not have telephones, bicycles or automobiles as they are now made. Nearly all machines and appliances operated by electricity have some parts made of rubber. Then there are hundreds of small articles, such as combs, hot water bottles, knife handles, buttons, etc., that are so common that we never think of the material which enters into their manufacture.

The rubber industry was first developed in the United States, and that country still maintains its supremacy. Akron, Ohio, is the largest rubber manufacturing center in the world, and it uses more than one-half of the world's supply of crude rubber. Of the rubber imported into the United States, fully 90 per cent is demanded by the automobile industry, and is manufactured into tires and inner tubes in Akron. Most of the rubber for American manufactures comes from Brazil, Central America, Dutch East Indies, and Mexico. Africa and Ceylon supply most of the European mills. The demand for crude rubber has grown so rapidly that plantations in Brazil, Mexico, Ceylon and other countries are expanding.

History. The Spaniards who followed Columbus to Central America found that the Indians played with balls made from the juice of a tree. These balls were objects of curiosity, because, when they hit a hard object, they would rebound. Without doubt these were rubber balls. Probably the Indians had known of this substance for centuries, but they never made practical use of it. They

called the tree from which rubber is obtained *caoutchouc*, which means *weeping tree*. The name *rubber* was given this peculiar substance by the English chemist Priestley, the discoverer of oxygen. While experimenting with a ball of rubber, Priestley discovered that it would erase lead pencil marks, and so far as known this is the first practical use of rubber by civilized man. The term *rubber* is known only in the English language.

RUBENS, PETER PAUL (1577-1640), the foremost painter of the Flemish school. He was distinguished as a portraitist, a painter of religious and mythological subjects, landscapes and animals, and he was equally successful in depicting the peasant and the beribboned courtier. A courtier himself, with exceptional tact and a fluent use of six languages, he acted many times in a diplomatic capacity when Spain, Holland and England were involved.



PETER PAUL
RUBENS

Rubens was born at the German town of Siegen, Westphalia. His mother was Dutch, and after the boy's father died the family lived at Antwerp. Here Peter Paul studied under the leading masters and in 1598 was himself recognized a "master" and admitted to the painters' guild. Two years later he went to Italy to study the works of the Italian masters, and there entered the service of the Duke of Mantua, for whom he executed numerous paintings and diplomatic services. He returned to Antwerp in 1608, became court painter to Archduke Albert, and the following year married Isabella Brant. He soon became the most sought-for painter in Europe. Commissions poured into his studio, and were arranged years in advance. He was knighted by Charles I of England and Philip IV of Spain. To this period belongs his greatest masterpiece *The Descent from the Cross*, in the Notre Dame Cathedral, Antwerp.

In 1622 Rubens was invited by the queen mother Marie de' Medici to Paris to decorate a gallery of the Luxembourg with allegorical pictures pertaining to incidents in her life.

His wife died in 1626, and four years later he married Helene Fourment, a buxom young woman, who appears on many of his canvases. His life was successful and happy throughout, and his artistic power remained undiminished to the end.

Rubens' productivity was almost incredible. He executed about 1,500 pieces, which are distributed among the leading galleries. While he lacked the delicacy, restraint and grace of the Italians, he was not far behind the greatest Venetians as a colorist; and in the realm of the spectacular he is supreme. Life appeared to him as a pageant and on a large scale, and he had the gift to see the great panorama as a whole and in detail. His principal works include *The Crucifixion* (Antwerp Museum), *Emperor Maximilian I* (Vienna), *Lion Hunt and Children with Fruit Garland* (Munich Gallery).

RUBICON, the river which Julius Caesar crossed with his legion in 49 B. C. when he entered Rome and defied the Republic, whose senate had passed a decree ordering Caesar to disband his army. When Caesar led his army across the river, he virtually declared war against the Republic. From this event the phrase "to cross the Rubicon" has come to mean to take some decisive step which commits one to a hazardous enterprise from which there is no retreat. The river is a small stream in Northern Italy, flowing into the Adriatic.

RUBIDIUM, a rare metal, discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis. It is a white, shining metal, and at ordinary temperatures it is as soft as wax. It is usually found in connection with caesium, and it belongs to the group of the alkali metals.

RUBINSTEIN, *roo'bin stine*, ANTON GRIGOR'EVICH (1830-1894), a famous Russian pianist and composer. He studied at Berlin and Paris, taught for a time at Vienna and finally settled in Saint Petersburg, founded the Saint Petersburg Conservatory of Music and was director of it until 1867. Rubinstein made numerous concert tours of Europe, and in 1872, with the violinist Wieniawski, visited America. He was everywhere recognized as one of the world's greatest performers. His chief ambition, however, was in the field of composition, a field in which he was less successful. He composed chamber music, songs, symphonies, concertos and oratorios. These, while contain-

ing passages of wonderful beauty, have not a uniform excellence, and they are rarely heard to-day on the concert stage.

RUBLE, or **ROUBLE**, *roo'b'l*, a silver coin, the monetary unit of Russia. Its value was standardized in 1897, and remained fixed until the revolution of 1917. Formerly the ruble was equivalent to 100 kopecks and to 51½ cents in United States and Canadian money. Half and quarter rubles of silver were issued, as well as 15 and 7½ ruble gold pieces. After the overthrow of the imperial government the ruble declined steadily in value, but the Soviet government has raised it to its historic value.

RUBY, or **RED SAPPHIRE**, a precious stone of a deep red color, of which there are two varieties, the oriental and the spinel. The *oriental ruby*, or *true ruby*, is a corundum, formed nearly exclusively of alumina; it is of great hardness, and is a perfect stone, having many times the value of a diamond of the same size, is the most valuable of all precious stones. Oriental rubies are found chiefly in Burma and Siam; inferior specimens have also occurred in North America and Australia. Genuine rubies of small size occur in stream gravels in Macon County, North Carolina. *Spinel rubies* consist of an aluminates of magnesium and are much inferior to the true rubies in hardness and value. They are found in Burma, Ceylon and Australia. The ruby is the birthstone for July. See **PRECIOUS STONES**

RUDE, **FRANÇOIS** (1784-1855), one of the leading French sculptors of the nineteenth century, born at Dijon and educated at Paris and at Rome. After about twelve years spent in Brussels, he settled at Paris where, in 1828, he exhibited his *Mercury Fastening His Sandal* and shortly afterwards the *Neapolitan Fisher Boy*, both of which are now in the Louvre. Following there came a series of masterpieces which gave him rank among the greatest of French sculptors. He was equally at home in classic fields and in the modern realistic school, as his *Hebe* and *the Eagle*, *Amor Victor*, *Fisher Boy* and *Joan of Arc* bear witness. Rude executed a number of portrait statues and civic pieces, chief of which is a group entitled *The Departure*, representing the departure of volunteers from Paris in 1792.

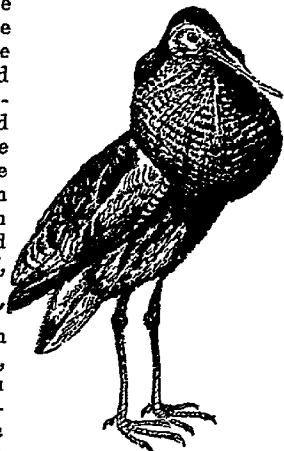
RUFF, a species of sandpiper, from ten to twelve inches in length, which varies greatly in color, being principally brown, with

white on the wings and belly. In the breeding season there appears on the neck of the male a group of long plumes, which when raised, form a kind of ruff, which has given its name to the bird. During the same season the male is disposed to fight any approaching bird or enemy. The females, who are more uniform and modest in coloring and lack the ruff, are called *reeves*.

RUFFO, *ru'fo*, **TITTA**, an Italian baritone, pupil of Cassini of Milan, popular in both lyric and dramatic rôles; born, 1877. He toured Italy and South America and appeared with success in New York and Chicago. Among his greatest achievements were rôles in *Pagliacci* and *Hamlet*.

RUGBY SCHOOL, the most famous of the English public schools, was established at Rugby in 1567 by the will of Lawrence Sheriffe, a Rugby grocer. Because of litigation over the will, the school remained in obscurity during the first century of its existence, and during the next century it gained but little. Its wide reputation is due to the work of Thomas Arnold, who became head master in 1829 and completely revolutionized the system of instruction and discipline, placing both upon a much higher plane than English schools had previously known. Arnold's successors have followed his plan, and the school now takes high rank among English institutions. The course of study gives most attention to classics, but includes science, modern language and mathematics. The number of students is about 600. The best description of life in this school during Arnold's administration is found in *Tom Brown's School Days*, by Thomas Hughes. See **ARNOLD, THOMAS**

RUGS, floor coverings divided into two classes, known as *Oriental*, and *domestic rugs*. Orientals are the most durable and valuable of all rugs, and they are very expensive



RUFF

Varieties of Oriental Rugs. The date of the origin of the making of Oriental rugs is lost in antiquity. The similarity in forms and inscriptions of ancient Egyptian architecture to the designs characteristic in the modern Oriental rug connects the art of rug weaving with that remote era. Oriental rugs are now generally divided into six groups, known as Persian, Bokhara, Turkish, Caucasian, Chinese, and Indian; each group has its subdivisions, the rugs taking the names of the districts and towns where they are woven.

The finest rugs made in the world, representing the most perfect conventionalization of flowers, leaves and other vegetation, come from Persia. No others can stand favorable comparison with the exquisite *Ispahan* creations of the sixteenth century, with their gorgeous foundations of Ispahan red with varied floral designs and fine tracings of puzzling, fascinating lines. Only a few perfect specimens now are counted among the treasured possessions in private collections. The most notable weaves of Persian rugs include the Kashans, the Kirmans, the Kurdistans, the Saruks, the Hamadans, Shirazes and Shenas. Both wool and cotton are employed in their weaving.

The Bokhara group, made in Central Asia, are distinguished by their very wide selvages and long fringes; their motifs are large and geometrical and are in dark red, outlined with black or white.

Caucasian rugs, also with uniform geometrical designs, are lighter in tone than the Bokharas. They are knotted rather than woven. The best-known weaves are the Daghestans, Shirvans, Kazaks, and Soumaks.

Turkish rugs are not so extremely rectilinear as the Caucasian rugs, the Ghiordes, Kulah, Melez and Bergamo being the most familiar. Most of the modern rugs now made in Turkey are of inferior type, excepting the very large examples from Persian wools woven in the sultan's works at Hereke.

Chinese rugs are very individual, with their dragons, unique varieties of the lotus flowers and odd geometrical designs distributed on harmonious grounds of gray, blue, yellow, or cream. The warp of Chinese rugs is always cotton. Fine examples of Indian rugs come from Tanjore and Benares; they are distinguished by their medallion centers.

The Prayer Rug. The prayer rug, which all devout Mohammedans always carry with them, is one of the most pronounced patterns

in Oriental rugs. Upon this rug the worshiper performs his devotions, his face and the point of the pattern being turned toward Mecca.

European and Domestic Rugs. The most familiar European rug is the *Brussels*, sold either as a rug, or "art square," as it is sometimes called, or as a carpet. Originally made in Brussels, it was copied in England, whence it was introduced into America. The *Wilton*, manufactured first in Wilton, England, is also made in Oriental patterns and has a velvetlike surface. The *Axminster*, likewise named after a small English town where it was first manufactured, is a comparatively inexpensive yet attractive copy of Turkish designs. A variety of Axminster, known as *Smyrna*, with the nap, or pile, on both sides, is now extensively manufactured in the United States.

RUISDAEL, *rois'dale*, JACOB VAN. See RUYSDAEL, JACOB VAN.

RULES OF THE ROAD. Regulations, formulated by custom or usage, or more generally by statute or city ordinance, by which traffic is regulated on land, sea, or in the air. While the principles are similar, different sets of rules have been generally prescribed for travelers using these several methods of transport. It is essential that some principle be generally recognized, and that each traveler shall so control his vehicle or vessel or aircraft as not to interfere unduly with the right of passage of another, and reasonable care and accommodation be used to afford others their just and reasonable use of the highways.

On land, the main highways carry an increasing burden of traffic, and the observance of the accepted rules is a necessary measure for safety. In the United States and most other countries it is held that when one vehicle meets another, each must keep to the right side of the road, and one overtaking another must pass on its left. (In Great Britain the rule is the opposite.) The general rule in case of travelers whose courses cross is that the one reaching the crossing first is entitled to proceed, while the other shall slow down or stop until his way is clear. The statutes and ordinances of the different States and municipalities lay down regulations as to rates of speed, lights to be carried, and similar matters. In cities and large towns stop lights at intersections of streets serve to regulate the traffic and to remind both drivers and pedestrians of the necessity of observing the rules.

The rules for watercraft on the open sea are for the most part modern, and are the subject of international agreement. The most important of these rules are. (1) a ship under steam must avoid sailing ships; (2) a ship sailing free must give way to one close-hauled, (3) where both are close-hauled, the one on the port tack must give way to the one on the starboard tack (4) when both have the wind on the same side, the one to windward must give way, (5) when two vessels under steam meet, each must turn to starboard.

Air-traffic rules are made by the Secretary of Commerce. Pilots must maintain safe altitudes, to permit reasonably safe landing, but in no case less than 500 feet. Aircraft must keep to the right of established airways. In crossing, approaching or overtaking, aircraft follow generally the land rules. Airplanes should give way to airships and airships to balloons. Safety is the first consideration in all traffic regulations.

RUM, a strong alcoholic liquor, obtained by distilling molasses and the refuse derived from the manufacture of cane sugar. Pure rum is colorless. Its brown tint is imparted to it by the addition of caramel and by storing it in casks that have contained sherry. Most of the rum is manufactured in the West Indies, and the name *Jamaica rum* is applied to the best grade, regardless of its place of manufacture. The strength and quality improve with age. Rum contains a large percentage of alcohol, and can therefore no longer be manufactured or sold where prohibition laws are in effect.



RUMANIA, a kingdom in the southeastern part of Europe, one of the several nations of that continent which have achieved national independence by throwing off the Turkish yoke, Rumania has been a free country since the Russo-Turkish War of 1877-1878. At that time it included the former principalities of Moldavia and Wallachia (united in 1861), and the district known as the Dobruja, which was ceded by Bulgaria. By the Treaty of Bucharest (August, 1913), at the close of the Balkan Wars, Rumania acquired an addi-

tional territory of 2,969 square miles, and at the outbreak of the World War in 1914 its total area was 53,489 square miles, about the same as that of the state of Arkansas.

Rumania lies north of Bulgaria and west of the Black Sea. In the extreme west it is separated from the Serbia of 1914 by the Danube River. Before the dissolution of the Austro-Hungarian monarchy in 1919 it was bounded by Austria-Hungary on the west and north, the two being separated by the Carpathian Mountains. It also touched Russia on the north and was separated from that country on the east by the Pruth River. The outcome of the World War, in which Rumania fought with the entente against the Germanic alliance, resulted in an enlargement of Rumanian territory and a change of the boundaries adjoining former Austria-Hungary and Russia. By the treaties of 1919 Rumania was given Transylvania and the Banat, which had belonged to Hungary, Bukowina, a former Austrian crownland, Bessarabia, in the extreme southwest of Russia, and the territories of Crisana and Maramuresh. With these additions, Rumania was more than doubled in size, the area of the entire Kingdom being increased from 53,489 square miles to 122,282 square miles.

The People. The population of Rumania in 1915 was 7,900,000; new Rumania, in 1934, 18,791,645. The large majority are Rumanians, and the rest are Jews, gypsies, Bulgarians, Serbs, Germans, Hungarians, Turks and Armenians. There are several million Rumanians inhabiting Transylvania, the Banat, Bukowina and Bessarabia, and it is on this fact that Rumania based its claim to the territories in question. The Rumanians are not Slavs. They claim to be direct descendants of the Roman colonists sent by the Emperor Trajan into the province of Dacia (modern Rumania), but authorities regard them as a mixture of the original inhabitants of the region with Romans, Teutons, Slavs and Mongols. Their language is derived from the Latin, and is more like Italian than any of the other Romance languages. Orthodox Greek is the state religion.

Government and Education. The government is a constitutional monarchy, the throne being hereditary in the male line of descent. The king is assisted by a Cabinet consisting of eleven Ministers and a Premier, the president of the council. The legislative power is vested in a Senate and a Chamber

of Deputies, the members of each being chosen by ballot. The Senate consists of 120 members, elected for eight years, and the Chamber of Deputies, of 387 members, elected for four years. Education is free and compulsory, but there are not enough schools as yet to take care of the population. However, conditions are improving, and the former high rate of illiteracy is slowly being reduced. There are four universities, the principal one in Bucharest, the capital.

Physical Features. The Carpathian Mountains form most of the boundary between Rumania and Transylvania and constitute an unbroken barrier. Spurs of these mountains extend into the country for short distances, but in the main Rumania is an extensive low plain. The northern portion is occupied by a tableland, which slopes toward the south and in which the rivers have worn deep channels. The southern part of the country slopes from the Carpathians, or Transylvanian Alps, toward the Danube. The eastern portion, along the Danube, is low and marshy and rises but little above the level of the sea. The Danube forms most of the southern boundary and that portion of the western boundary which separates the country from Serbia. Near the eastern end of Rumania the Danube flows northward and then again eastward into the Black Sea. The Dobruja is that portion of the country lying south and east of the river. The important tributaries of the Danube are the Aluta, the Dimbowitza and the Jalomitza, draining the southern part of the country; and the Sereth and its tributaries, draining the northern part.

The climate is similar to that of the adjoining portion of Russia. The winters are intensely cold, the thermometer sometimes falling as low as 20° below zero. The summers are hot, and the rainfall is irregularly distributed throughout the year, being heaviest in June, while the late summer months are usually dry. The mean annual temperature at Bucharest is 51°, and the mean temperature for July, 73°.

Resources and Industry. The country is rich in minerals. Gold is found in the beds of some of the streams. There are also ores of iron, lead, clay, silver, copper and manganese, and deposits of coal. Salt is found in large quantities and has been mined for ages. Marble of excellent quality occurs, as do clay and sand suitable for glass and porcelain ware. These and common building

materials are widely scattered over the country. The most valuable mineral is petroleum. In the Carpathian foothills are some of the most profitable oil fields in the world, and though the wells were seriously damaged during the war, their reconstruction was begun as soon as Rumania was cleared of German forces. Before the war their output was about 1,750,000 tons a year.

The lowlands are covered with a fertile soil, and agriculture is the leading occupation, giving employment to about eight-tenths of the population. Rumania is one of the most important grain-producing countries in Europe and raises large quantities of wheat and Indian corn, the annual crop of the former being about 90,000,000 bushels and of the latter, about 110,000,000 bushels. Barley, rye and oats are also produced in quantity. Grapes and other fruits are grown in the foothills of the mountains and large quantities of wine are made. Prunes are also extensively cultivated. Considerable attention is given to the raising of live stock, and large numbers of horses, cattle, sheep and swine are grown and exported.

Before the World War the peasants owned about one-third of the arable land, the rest being in the hands of large proprietors, who rented it out in small sections. This system was the source of much discontent, and tended to create a feeling of hostility between the peasants and the proprietors. In February, 1919, the Rumanian Parliament passed a land reform measure whereby the large estates were divided among the peasants, making Rumania a country of small farmers. The former proprietors, who were permitted to retain only fifteen per cent of the arable land, were assured a yearly income from the state as recompense for giving up their holdings.

There are nearly 7,000,000 acres of forest land, the principal trees including oak, beech, pine, fir, maple and elm.

Rumania is not a manufacturing country in the modern sense of the term. There are flour mills and great oil refineries, and there is brewing and distilling, but most of the manufactured products needed by the population are imported.

Transportation and Commerce. The Danube is the chief waterway, and it serves as an important means of transportation for the produce of the country. Lines of railway also extend through the country from the



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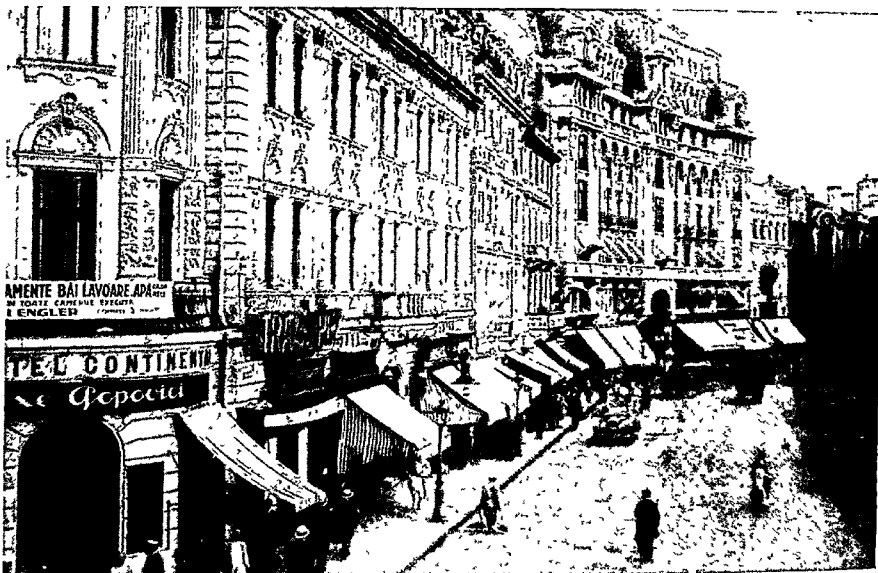
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SCENES IN RUMANIA

Above (at left), Michael, when he was king, in 1927, before his father reclaimed the throne; (at right) Rumanian girls in their national peasant costume, below, a typical modern peasant home, with straw-thatched roof



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BUCHAREST, RUMANIA

Above: Airplane view of the capital city, showing the main street and adjoining closely packed and solidly constructed buildings.

Below: Calla Victoria, the principal street of the city.

north to south and from east to west and connect its leading cities with those of neighboring countries. There are about 7,000 miles of railway, most of which is owned by the government. The exports consist of wheat, corn, wine and other agricultural products; and the imports are manufactured goods, machinery and such foodstuffs as are not profitably grown within the country.

History. The territory now included in Rumania was occupied in ancient times by a people called Dacians, and formed a part of the Roman Province of Dacia. During the Middle Ages the independent principalities of Moldavia and Wallachia were organized out of the territory. Later these became tributary to Turkey, but during the nineteenth century Russian aggression brought them under the influence of the czar. The Rumanians endeavored to secure their independence, and after the Crimean War the two principalities united in 1861, but continued tributary to Turkey until the Berlin Treaty in 1878, when the European powers acknowledged their independence. Soon after, the present government was organized. Rumania did not take part in the first Balkan War against Turkey, but it sided with Serbia and Greece in the second phase of the struggle against Bulgaria, and was rewarded by receiving nearly 3,000 square miles of territory formerly belonging to Bulgaria. This territory was formed into the two districts of Calaisera and Duroster.

In October, 1914, King Charles, the Rumanian sovereign, died, and was succeeded by his nephew, Ferdinand. In August, 1916, Rumania entered the World War by declaring war on Austria-Hungary, and began an offensive into Transylvania. The German staff sent Von Mackensen and Von Falkenhayn to direct a counter-offensive, and, attacked by Germans, Austrians and Bulgarians, the Rumanians were soon swept back, while the enemy not only cleared Transylvania but occupied Wallachia and the Dobruja. Rich stores of grain and oil fell into German hands and helped relieve the desperate economic situation in the central empires. In November Bucharest was abandoned by the Rumania government, which removed to Jassy, in Moldavia.

Though crushed, Rumania remained loyal to the allies, and withdrew from the war only when the Bolshevik government of Russia made peace with Germany, leaving the

smaller country helpless. It is known that Rumania's untimely entrance into the war and its speedy collapse were the result of an intrigue between Germany and the treasonable reactionaries who had control in Russia before the downfall of the czar. Rumania was forced to submit in 1918, but when the treaties of 1919 were drawn, the country was enlarged by the addition of Bessarabia, Bukovina, Transylvania and other territory. The government was reorganized, a new constitution was adopted in 1923, giving the people larger representation.

On the death of King Ferdinand in 1927, his 6-year-old grandson, Mihai (Michael), was proclaimed King, under a regency. Prince Carol, the father of the young King, who had renounced his right of succession in 1925, suddenly appeared in June, 1930, and was at once proclaimed King, his son Mihai receiving the title Prince of Alba Julia. Government efforts have been directed to reform of the country's finances, to attract foreign capital, and to bring relief to agriculture.

Related Articles. Consult the following titles for additional information

Balkan Wars	Danube
Bessarabia	Dobruja
Bucharest	Jassy
Bukovina	World War

RUMELIA, *ru mel'ia*, the name formerly given to a division of Turkey, in Europe, which comprised ancient Thrace and a part of Macedonia. The name signifies "the land of Rome" and was given to the country because when the Mohammedans conquered the Byzantine they considered the inhabitants of this section of Europe Romans.

RUMINANTS, the name of that order of animals that chew the cud. Cattle, sheep, goats and deer are the most common representatives of the order in America. The camel, the antelope and the llama also belong to the order, which includes nearly all of the most useful domestic animals. With the exception of the camel, the ruminants have no incisors or cutting teeth in the upper jaw. When a cow or a sheep feeds it thrusts out its long tongue, seizes a bunch of grass and tears it off, and this mouthful of grass mixed with saliva is swallowed into the first stomach. Later, when the animal is resting, this food is brought upward into the mouth in small quantities and thoroughly masticated between the large molar teeth. The food is then swallowed into the second stomach, where it is digested. All ruminants have

hoofs, and they belong to the division *Un-gulate*, or hoof-bearing animals.

RUMP PARLIAMENT, in English history, the name given the remnant of the Long Parliament after the majority of its members had been expelled by Cromwell's soldiers under Colonel Pride, in 1648. Only sixty members remained, and these in conjunction with the army brought about the condemnation of Charles I. These members constituted the *rump*, and the body was ever after known as the *Rump Parliament*. It was forcibly dissolved by Cromwell in 1653 for opposing the demands of the army. It was reinstated twice later, but for only brief periods. In March, 1660 it decreed its own dissolution.

RUNES, *runes*, the earliest written characters of the ancient Teutonic people of Northwestern Europe. They are formed almost invariably of straight lines, and are found engraved on monuments, tombstones, rings and weapons. Occasionally a manuscript of later date contains them. Traces of runes are found in those parts of England that were first conquered by the Angles and Saxons, especially in Northumbria, Mercia and East Anglia. Runic inscriptions abound in Scandinavia, Denmark and Iceland.

The origin of these characters is not known, but Anglo-Saxon tradition ascribes their invention to Odin. Instruments and weapons bearing runic inscriptions dating from A. D. 300 to 400 have been found in Norway. The name is believed to be the same as the Anglo-Saxon word *run*, meaning *mystery*. The inscriptions were associated with the magical rites of heathen worship; for this reason their use was forbidden by the early Christians, and they were gradually forgotten. The latest runic inscriptions in Sweden date from about 1450.

RUNJIT SINGH, *run ject Sing'h*, (1780-1839), maharaja of the Punjab, India, and founder of the Sikh kingdom. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjit rebelled against his mother's authority and assumed the power himself. The shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjit soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjit in

1809, accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model, with the help of French and English officers, and steadily extended his power, assuming the title of raja in 1812. His boundaries continued to widen until, by 1819, he was ruler of the entire Punjab, with title of maharaja, or king of kings. In 1836 he suffered a heavy defeat from the Afghans, but he retained his power until his death.

RUNNIMEDDE, the meadow on the right bank of the Thames, in Surrey, England, four miles below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island, opposite Runnimede. A race course now occupies the site of Runnimede. See **MAGNA CHARTA**.

RUPEE, the unit of value in the monetary system of British India. The weight of a rupee, 180 grains (troy), 165 grains of which are of pure silver, is fixed by the British government. The value of the coin as currency, which formerly fluctuated, is also fixed at the equivalent of thirty-two cents in United States or Canadian money. One-sixteenth of a rupee equals an *anna*. Other denominations are half-rupees, quarter rupees and eighth rupees. A *lakh* equals 100,000 rupees; a *crore*, 100 lakhs.

RUPERT'S LAND, the name formerly applied to a vast tract of land bordering on Hudson Bay and then belonging to the Hudson's Bay Company. The territory was granted to the Hudson's Bay Company by Charles II of England, and was held by them until 1869, when the title was surrendered to the British government. In 1870 the title was transferred to the Dominion of Canada. The boundaries were never definitely determined. The territory was formerly known as *The Canadian Northwest*. That portion of it north of the organized provinces is now known as the *North West Territories*. Rupert's Land was named for Prince Rupert, the first governor of Hudson's Bay Company.

RUPTURE. See **HERNIA**.

RURAL CREDITS. The problem of providing credit facilities to farmers has engaged the attention of agriculturists and economists for many years. Manufacturing and commercial enterprises have depended on capital supplied by shareholders and on credit by banks to conduct their business

and to carry them over dull seasons in trade Rural credit presents a more complex problem. The credit facilities to farmers are of two classes: (1) temporary personal credits, from local merchants and bankers, to carry the farmer from seed time to harvest or to relieve him in case of emergency; and (2) mortgage, or long-time, credit to make possible the improvement of land and the provision of suitable equipment for planting, cultivating, and marketing crops.

Farm mortgages are costly and difficult to supervise; crop failures often suspend interest payments, and sometimes necessitate surrender of title to the land.

To meet the urgent need of tillers of the soil for larger and more readily available credit facilities, mortgage banking has been developed in connection with agricultural operations.

Federal Farm Loan Act. The United States Congress in 1916 passed the Federal Farm Loan Act, which provided for a national system of rural credits, administered by a Federal Farm Loan Board. This Board consisted of five members, of whom the Secretary of the Treasury was *ex officio* chairman, the other four being appointed by the President.

Federal Land Banks. The United States, exclusive of Alaska, was divided into twelve districts, known as Federal Land Bank Districts. In each district is a Federal Land Bank, managed by a board of directors, six members of which are chosen by the Farm Loan associations of the district, and three appointed by the Federal Farm Loan Board.

Each Federal Land Bank must have a capital of at least \$750,000. The capital stock, in shares of five dollars each, may be held by any individual, firm, or corporation, or by the government of any state or of the United States.

National Farm Loan Associations. Persons desiring to borrow money on farm mortgage security are required to form organizations known as National Farm Loan associations, duly officered and approved by the Federal Land Bank of the district.

Only farmers or those about to become farmers can become members of these associations. Each member is required to subscribe for stock in the association to the amount of five per cent of the loan for which he applies. For the loan the farmer gives his personal note, secured by a first mort-

gage on his land. No commission is charged to the farmer.

No loan is granted for less than \$100, nor for more than \$10,000. In any case, the loan cannot exceed fifty per cent of the value of the land and twenty per cent of the buildings and other improvements.

Loans are not made on land not occupied or tilled by the owner. They are granted for the following reasons:

- (a) To purchase land for agricultural use.
- (b) For equipment, fertilizer and livestock.
- (c) For improving and erecting buildings.
- (d) For the discharge of a prior mortgage.

Farm Credit Act of 1933. An enlargement of the activities of the government in arranging rural credit was provided in the Farm Credit Act, passed by Congress in 1933. A Farm Credit Administration was set up, the governor of which was given authority to organize and charter twelve productive credit organizations and twelve banks for cooperatives, one each to be established in each city where there is located a Federal Land Bank. A central bank of cooperatives was organized to make loans to cooperative associations.

Federal Farm Mortgage Corporation. Rural credit facilities were further extended in 1934, when Congress authorized the establishment of the Federal Farm Mortgage Corporation, with capital of \$200,000,000, supplied by the United States Treasury, and with authority to issue bonds to the extent of two billions, guaranteed both as to principal and interest by the government.

The Frazier-Lemke Farm Mortgage Act. In 1935, Congress passed a law, known as the Frazier-Lemke Act, which permits debt-burdened farmers to go into Federal courts and obtain moratoriums on their mortgages for as long as three years. During that time their properties, in effect, are under court control. The act provides for an appraisal of the "fair and reasonable market value" of the property, which the farmer may retain for the period of the moratorium upon payment of a "reasonable" rental fixed by the court. The rental shall be applied to all charges, and whatever is left over will be applied against the farmer's indebtedness.

RURAL HIGH SCHOOL. See HIGH SCHOOL.

RUSH, a plant of the sedge family, which grows in marshes and on the banks of streams and ponds. The smooth, leafless stems grow

to a height of three feet. They are tough and flexible and are used in making baskets, chair-bottoms and mats. The various species of rush are found in swampy places the world over. See HORSETAIL RUSH; BULRUSH.

RUSKIN, JOHN (1819-1900), one of the most eminent English art critics, authors and social reformers of the nineteenth century, was born in London. His parents were Scotch, and they attended carefully to his education. He studied at Christ Church, Oxford, and before his graduation won the Newdigate prize for his poem *Salsette and Elephanta*. In 1843 he produced the first volume of his *Modern Painters*, a great work on art criticism. Other volumes appeared at intervals during the next seventeen years. *The Seven Lamps of Architecture* and *Stones of Venice*, criticisms on architecture, followed.



JOHN RUSKIN

In 1860, with the publication of *Unto this Last*, Ruskin appeared as a social reformer; and he engaged actively in the work which he championed in his writing. He improved the condition of several tenement houses, had streets cleaned and, in fact, devoted the greater part of his fortune to the improvement of the working classes. From 1871 to 1879 and from 1883 to 1884 he was Slade professor of art at Oxford, but was obliged to resign on account of ill health.

Besides the works already mentioned, Ruskin wrote, among others, *Fors Clavigera*, a series of letters to the workmen of England; *Poems*; *Sesame and Lilies*; *Ethics of the Dust*; *The Crown of Wild Olive*; *The Queen of the Air*; *Mornings in Florence*, and *Præterita*. Eloquence, force and subtle analysis are the prevailing characteristics of Ruskin's literary style, and his works are permeated with a lofty enthusiasm for truth and beauty and with a generous sympathy for the poor and the weak. He is most widely known among children for his beautiful fairy tale *King of the Golden River*.

RUSSELL, ANNIE (1864-1936), in the generation now passing, one of the leading American actresses, born in Liverpool, Eng-

land, but taken to the United States in early childhood. Her parents were Irish. Miss Russell's first stage appearance was at the age of eight, in Montreal, Canada; not until 1881 did she achieve success in the United States, when she appeared in *Esmerelda* in New York City. Among her greatest successes are numerous Shakespearean revivals.

RUSSELL, BERTRAND, EARL (1872-), an English author and philosopher, was born in Trelleck, the second son of Viscount Amersley. At Trinity College, Cambridge, he attained high rank as a scholar, especially in the branches of mathematics and social science. He has been a prolific writer of books in which he has freely expressed his original—often radical—views on social questions. He had a wide and appreciative audience both in Europe and America.

The wide range of his intellectual interest is shown by the titles of some of his principal works.

German Social Democracy; Essay on the Foundations of Geometry; Philosophy of Leibnitz; Principles of Mathematics, Problems of Philosophy; Mysticism and Logic; The Analysis of Mind; The Prospects of Industrial Civilization.

RUSSELL, JOHN, Lord, Earl Russell (1792-1878), an English statesman, the son of the Duke of Bedford. Educated at a private school and at Edinburgh University, he entered Parliament in 1813, before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which he was the champion through life. In 1831 he was paymaster-general in Lord Grey's Administration, and though not in the cabinet, he introduced the first Reform Bill to the House of Commons. In the exciting struggle that followed, Lord Russell was popularly accepted as the great champion of reform. In Lord Melbourne's second cabinet, Russell was home secretary, and in 1839 he became a colonial secretary. From 1841 till 1845 he led the opposition against Peel (See PEEL, SIR ROBERT), with whom, however, he was in sympathy on the Corn Law Question. In 1846 he formed a ministry which remained in power until 1852. He then entered the Cabinet of Lord Aberdeen as Foreign Secretary, and in 1855 he became Colonial Secretary in Lord Palmerston's Cabinet. He represented Great Britain at the Vienna Conference. In 1865 he succeeded Palmerston as leader of the Liberal party.

RUSSELL, LILLIAN (1861-1922), an American actress and light opera singer, born at Clinton, Iowa. Although she had appeared earlier in amateur theatricals, she made her first professional appearance at eighteen, in *Pinafore*. She became prima donna of the McCaull Opera Company and later, as head of her own company, presented *Virginia and Paul, Polly, The Queen of Brilliants, Fiddle-dee-dee, Lady Teazle, The Butterfly*, one of her foremost successes, and *Wildfire*. She was later seen in vaudeville, but retired from the stage after her marriage, in 1912, to A. P. Moore, owner and editor of the *Pittsburgh Leader*. Her name, before adopting that of Russell, was **HELEN LEONARD**.

RUSSELL, SOL SMITH (1848-1902), an American actor, born in Brunswick, Maine. As a drummer boy he was with the Federal army during the Civil War, and after the close of the war he began to play small parts. At Saint Louis, in 1865, he achieved his first real success, and two years later joined Augustin Daly's company, rising to stellar heights in 1880 in *Edgewood Folks*. His greatest success was won in *Peaceful Valley, A Poor Relation* and *A Bachelor's Romance*—plays written for him and well suited to convey the sentiment and comedy and the gentle and whimsical moods which this actor so admirably expressed.

RUSSELL SAGE FOUNDATION, an institution founded in 1907 by Mrs. Russell Sage, who gave \$10,000,000 for its endowment. The purpose is "the improvement of social and living conditions in the United States of America," but it does not seek to improve conditions by merely relieving distress. Its object is to remove the causes of poverty and distress. The work of the Foundation is carried on by departments. The most important departments are those of Charity and Organization; Child Helping; Remedial Loans; Recreation, and Education. The Department of Recreation has done much to further the use of school buildings as social centers. The Department of Remedial Loans has been active in exposing the methods of loan sharks.

The Russell Sage Foundation House Company has constructed at Forest Hills Gardens, on Long Island, a number of attractive and convenient houses at remarkably low prices. These are rented to families of moderate income. In this way the Foundation is trying to solve the housing problem in a large city.



RUSSIA, *rush'a*, the fatherland of the greater portion of the Slavic race. In 1914, the year which witnessed the outbreak of the World War, the name Russia stood for a great empire in Europe and Asia, extending from the Baltic Sea to the Pacific Ocean, and ruled by a czar who held dominion over one-sixth of the land area of the globe. This name stood also for despotism; for oppression of the masses; for the exiling of lovers of freedom; for the rule of the privileged classes, who represented but a small fraction of the population. Farsighted observers knew that a Russian upheaval was coming sooner or later, but outbreak of the World War, in which Russia's Slavic millions rallied to the defense of their friends in the Balkans, seemed to unite the people and to check the smoldering fires of revolution. The war, however, could not indefinitely postpone the rising of the masses. The storm broke early in 1917; then followed the downfall of the imperial government, and a long period of desperate suffering on the part of the people, as they struggled to reconstruct their nation, on a pattern hitherto unknown in the world.

Physical Features. Russia proper is a vast plain, which is divided into northern and southern slopes by a height of land, which passes in an irregular direction from a little north of the middle point in the Ural Mountains to the point on the Baltic where the boundaries of Russia and several small states unite. This height of land attains its greatest elevation in the Valdai Hills, directly south of Leningrad. These have an elevation of a little over 1,000 feet. On the south are the Caucasus Mountains, which have an elevation of over 18,000 feet, and to the west of these is a range of low mountains in the Crimea, which attains an altitude of about 4,000 feet. In the northern part of the eastern boundary are the Urals, reaching at the northern extremity an altitude of about 7,000 feet, though having an average height of from 4,000 to 5,000 feet.

Russia has a number of large and important rivers. To the north of the watershed and flowing into the Arctic Ocean or its coast waters are the Petchora, draining the northeastern part of the country; the Mezen, the Dvina, flowing into the Gulf of Archangel, and the Onega, flowing into the Gulf of Onega; while those flowing into the Baltic or its coast waters are the Neva, the Duna, the Niemen and the Vistula, which in the lower part of its course flows through Prussia. Of the great rivers flowing southward we find the Ural, the Great Uzen, the Volga and the Cuma, flowing into the Caspian; the Don, flowing into the Sea of Azov, and the Dnieper, the Bug and the Dniester, flowing into the Black Sea. All of these streams are navigable in the lower parts of their courses, and some of them are navigable for many miles. Russia has a number of large lakes, nearly all of which are situated in the northwestern part of the country. The largest, Lake Ladoga, north of Petrograd (now Leningrad), is about the size of Lake Ontario and is the largest lake on the continent. To the northwest of this, near Finland, are other large lakes, all of which are in a low country and have marshy borders. The Caspian Sea, with its surface eighty feet below the Mediterranean and entirely enclosed by land, is really a salt lake, and the Black Sea might also be considered in the same light.

Climate. Russia extends through nearly thirty-five degrees of latitude; consequently it has a varied climate, the extreme northern part being within the Arctic regions and the southern part falling within the warm temperate regions. The absence of mountain barriers causes the country to be swept alternately by winds from the north and the south; therefore it is subject to sudden and violent changes in temperature. The western portion also has a more equable climate than the eastern, because it is much nearer the sea. The mean temperature at Leningrad for January is about 15°, and for July it is about 64°, while at Odessa, on the Black Sea, it is much warmer. The average rainfall for the entire country is about twenty inches a year, but it is much greater in the northwestern than in the southeastern portions. The entire country in winter is usually covered with a heavy fall of snow and this adds much to the moisture and is of great advantage to agriculture.

Mineral Resources. Russia has an abundant supply of minerals, the most valuable being platinum, iron, copper, coal, salt, zinc, gold and silver. Coal is found in large quantities in the south-central part of the country, in the valley of the Donetz River. Iron occurs in the Ural Mountains, which are the depository of many other metals. In Caucasia are some of the most productive petroleum fields known to the world. Malachite, emeralds, diamonds and other precious stones occur in the Ural Mountains, and amber is found in the coasts of the Baltic. Building stone is not plentiful, but porcelain clay and clay suitable for brick and tile are found in a number of places. The lowlands along the Baltic contain extensive peat bogs. There are others, also, near Moscow, and these are an important source of fuel.

Agriculture. Under Soviet rule the farming community suffers from strict governmental control. In czarist days the single-owner farms totalled more than 300,000,000 acres; after fifteen years of Communism these were reduced to 72,000,000 acres. Most farmers have been forced into state farms called collectives, holdings being merged into large acreages for unit operation. All agriculture suffered a decrease in production, but averages for various crops are rising. All the cereals, where the soil is fertile, are grown, rye, wheat, and oats leading, in that order. The government imposed restrictions and penalties so severe on small farmers that horses, cattle, sheep, and swine have greatly decreased in number. As examples, within five years cattle decreased from 68 million head to 38 million; swine, from 21 million to 12 million. The Black Earth country, stretching east to west in Southern Russia, is one of the richest grain areas in the world.

Forests. In all of the Soviet Union there are more than two and a half billion acres of forests, two-thirds of which are in Russia proper, a considerable portion in swamps and marshes or in areas yet inaccessible.

Other Industries. In the forest region lumbering and the manufacture of potash, tar, turpentine and other forest products engage a large number of inhabitants. The fisheries of the country are also very important. Notwithstanding its numerous lakes and rivers, all of which are well stocked with fish, the country is unable to supply the local demand. The inhabitants of the ex-

treme north are engaged to a large extent in hunting and trapping and derive considerable revenue from the sale of furs and the feathers and down of water fowl.

Transportation. Russia has comparatively little seacoast and few important ports, but the vast plain occupying most of the country makes it possible for boats to navigate nearly all of the streams, most of which have been canahzed. In addition to these, there are many miles of canals connecting the different river systems, so that it is possible for boats to pass from the White Sea to the Caspian Sea and the Black Sea and from the Caspian Sea to the Baltic Sea. European Russia has a larger canal mileage than any other country.

The Russian Empire had an extensive commerce, carried on chiefly with Great Britain and Germany. The United States also had an important share. The exports consisted almost wholly of wheat, flour and leather, while the imports were raw material for manufactures, particularly cotton; manufactured goods, including clothing, machinery and scientific instruments, and food-stuffs. Under early conditions in the Soviet Union, induced by suspicion and lack of credits, commerce declined, but with leading nations it has been re-established.

Literature. The oldest writings in the history of Russian literature are translations from the Old Church Slavic language of religious works, parts of the Bible and rituals for Church service. The most important of the earliest writers was Nestor, who lived early in the twelfth century, and who wrote a celebrated *Chronicle*, which is not extant. From the time of the destructive invasion of the Mongols, in the thirteenth century, until the seventeenth century, life in Russia was on a low plain intellectually, but under Peter the Great literature began to revive. Not only did the new literature show forth the national spirit, but it began to have a distinctly European character. Throughout the eighteenth century the growth continued, and to one man of that century, more than to any other person, belongs the credit for fixing the literary form of the language. This was Lomonosoff (1711-1765), whose most important works were his writings on versification and rhetoric. During the reign of Catharine II, French influence was paramount, but this was superseded about the end of the eighteenth century by English and German influ-

ence. Literature sincerely mirroring the Russian people, less responsive to foreign influence, developed under great writers. As of yesterday the names of Tolstoi, Gogol, Saltikov, Ostrovsky, and Turgeneff add luster to the nation; among to-day's leaders none are better known than Solugub, Kuprin, Merezhkovsky, Tolstoi, and Gorky.

Old Russia. The area and population of the Russian domain at the outbreak of the World War are shown in the table.

DIVISION	Sq Mi	POPULATION
Russia in Europe	1,997,310	149,764,000
Russia in Asia	6,294,119	29,141,500
Finland	125,689	3,277,100
Internal Waters	347,468	
	8,764,586	182,182,600

Russia in Europe extended from the Arctic Ocean to the Black and Caspian seas, and from the Ural Mountains to the Baltic Sea and the former boundaries of Germany and Austria-Hungary. It occupied over half of the continent, and was about two-thirds as large as the United States. Russia in Asia included Siberia, the Steppes Provinces, Turkestan and Transcaspia. In this vast empire there was a great diversity of races and peoples, not only in the Asiatic portion but in the European. In Asia the czar ruled over 6,000,000 Russians, and numerous Armenians, Mongols, Persians, Turkomans,

PEOPLE	NUMBER	LOCATION
Great Russians	65,000,000	Center of European Russia, also in north and east
Little Russians	20,000,000	The Ukraine, north of the Black Sea
White Russians	6,000,000	Four governments in the west
Cossacks (Little Russians in speech)	3,000,000	East and south-east
Poles	8,000,000	Poland and western provinces
Germans	2,000,000	Baltic provinces, Poland, south Russia
Swedes	300,000	Finland
Fins and Karelians	3,500,000	Finland
Estonians	650,000	Baltic regions
Letts and Lithuanians	2,500,000	Baltic regions, Lithuania, Poland
Iranians	1,300,000	Caucasus
Rumanians	1,100,000	Bessarabia
Jews	5,000,000	Southwest, west

Tatars and other Orientals. The complexity of nationality in European Russian is indicated by the summary above.

The Soviet Republics. According to the most reliable statistics, the Union of Socialist Soviet Republics in 1933 contained a total of 8,241,921 square miles, and a population of 165,768,400. Of the total number of people, 146,000,000 were in the European area (the Ukraine accounted for 32,000,000), and the remainder were in the other five federated republics, described on another page.

History. In the ninth century Russia was inhabited by numerous tribes of Slavs, who had come, how long before is not known, from the neighborhood of the Carpathian Mountains. The total lack of union among the tribes made the Slavs an easy prey to invaders, who swept in upon them from all sides. Finally, about the middle of the ninth century, the Scandinavians, under their leader, Rurik, were invited by the Slavs to enter the country, assume rule over it and protect it from invasion. Rurik's power grew rapidly, and by 862, the date usually given as the foundation of the Russian Empire, he ruled from Novgorod a wide empire. Rurik died in 879, and Oleg, a member of his family, was made regent for Rurik's son. Under Oleg the capital of the country was removed to Kiev, and an attack was directed against Constantinople so successfully that the Byzantine emperor was obliged to pay a ransom for the city.

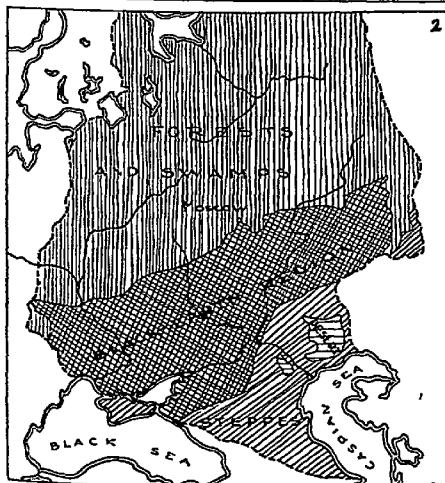
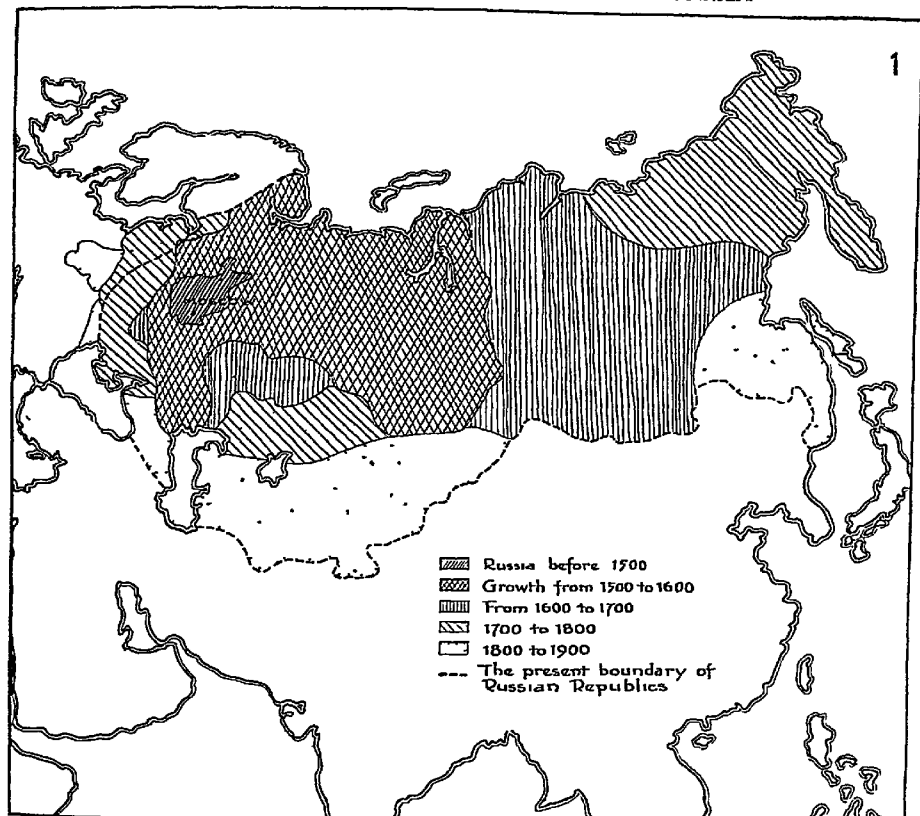
Gradually the descendants of Rurik strengthened and widened their kingdom, which came in time to be called Russia, probably from the name given by the Finns to the Scandinavians. Under Vladimir the Great (980-1015), the Greek form of Christianity was introduced into the country, and an effort was made to better the religious and intellectual condition of the people. By the end of the eleventh century the Russians had reached a plane of civilization little lower than that of the peoples of western Europe.

In the first half of the thirteenth century, however, the Mongols swept over Russia, and this invasion put an end to all self-government, to all intellectual progress, in fact, to all civilization. The country was cut off from western Europe, and the nationalization of the Slavs was delayed for centuries. Gradually Moscow became the strongest of the principalities of eastern Russia, and it was a grand prince of Moscow, Dmitri IV, who in 1380, by his victory over the Mongols, took the first step in the liberation of the country from the foreign yoke. As the principalities

came to recognize that, disunited, they could never hope to become free, they laid aside their dissensions and joined for the overthrow of the Tartars. Ivan the Great (1462-1505) succeeded in breaking the power of the Mongols by turning the different hordes against each other, and Ivan the Terrible (1533-1584) extended Russian rule over Kazan, Astrakhan and part of Siberia.

Following the strong rule of Ivan the Terrible came a period of anarchy and disorder, which ended with the election, in 1613, of Michael Romanoff to the throne. During the reign of Alexis, the son of Michael, considerable territory was acquired in a war with Poland, and a protectorate was assumed over the Polish Cossacks. Alexis left three sons of whom the oldest, Feodor, ruled but six years, expressing at his death the wish that his half-brother, Peter, should succeed him, rather than Ivan, the rightful heir, who was almost an imbecile. However, Peter's sister, Sophia, ambitious of power, succeeded in having Ivan proclaimed joint sovereign with Peter, intending to retain the power in her own hands. In the struggle which followed, Peter proved the stronger, Sophia was forced to retire to a convent and Peter became in reality the sole ruler of Russia, although Ivan was allowed to retain the title of czar. It is from the reign of this sovereign that the real greatness of Russia dates.

At the death of Peter (1725) the crown passed to his wife, Catharine, who was succeeded two years later by Peter's grandson, Peter II (1727-1730). The reigns of Peter, Anna Ivanovna (1730-1740) and Ivan (1740-1741) were of no great importance in the history of the country, but during the reign of Elizabeth Petrovna (1741-1762) occurred the Seven Years' War between Austria and Prussia, in which Russia took part on the side of Austria. Peter, the successor of Elizabeth, was murdered within a short time of his accession, and his wife came to the throne as Catharine II. Under Catharine Russia assumed a more prominent position among the European nations than ever before, and the genius of the queen enabled the country to support its position well. The partitions of Poland, by which Russia gained great accessions of territory, took place during Catharine's reign, and the Crimea was annexed in 1783. A war with the Turks (1787-1792), in which Russia was successful, advanced the boundaries of Russia to the Dniester.



RUSSIA THE HUGE

1. The growth of Russia from 1500 to the present 2. The kinds of land in European Russia; the black-earth region is the great wheat-raising area 3 Iron and coal are important to Russian industrial development

Paul I, the son of Catharine, succeeded her on the throne and ruled from 1796 to 1801. At the outset of his reign, he seemed favorable to reform, but he speedily changed his policy and enacted repressive measures that were so galling as to be almost unendurable. Finally he was assassinated, and his son, Alexander I, came to the throne. Alexander seemed fitted both by nature and by training for his position. He was a man of high ideals and of courage enough to carry them out. Among his first acts were the freeing of the serfs in the Baltic districts, the abolishing of the system of paid espionage and the discontinuance of torture as a legal punishment.

On the death of Alexander, in 1825, his brother, Nicholas I, came to the throne. Like Alexander, Nicholas began his rule in a liberal manner, but fell back later upon a policy of repression, overcome by the difficulties which met the reformer. His foreign relations led to war with Persia, participation in the Turkish defeat at Navarino, and finally to the great struggle known as the Crimean War, before the close of which Nicholas died. His successor, Alexander II, was forced to accept the Treaty of Paris, which took from Russia a part of Bessarabia and her protectorate over the Danubian principalities. Another war with Turkey, begun in 1877, resulted much more favorably for Russia, but she was obliged by the other powers to give up a part of her gains.

At the outset of his reign, Alexander began a series of radical reforms, but before his death he had adopted the old reactionary policy and had become very unpopular. He was assassinated in 1881, and his son, Alexander III, came to the throne. One of the most lasting in its results of any of the events of the reign of Alexander III was the agitation against the Jews. Many privileges were taken from them by law, and persecutions of all sorts were begun against them. With varying severity, this persecution has continued to the present day. On the death of Alexander III, in 1894, his son came to the throne as Nicholas II. He made few changes in his father's policy, continuing especially the attempt to advance Russian interests in the East. Railways were constructed in Asiatic Russia, and trading posts were everywhere established. In 1895, at the close of the war between China and Japan, Russia came into possession of the Chinese peninsula of Liao-tung, on which

Port Arthur is situated. This port was of the utmost importance to Russia, as affording an ice-free outlet for her Siberian commodities. Constant efforts were made to make the district about Port Arthur thoroughly Russian in language and in commerce, Korea was seized on some pretext and the annexation of Mongolia was attempted. No opportunity was overlooked for sending Russian soldiers into Chinese territory, and by the close of the Boxer trouble in China, Manchuria and half of Mongolia were firmly held by Russia.

Backed by the European powers, Japan protested against the aggressions of Russia and brought such pressure to bear that the evacuation of the territory by October, 1903, was promised by Russia. Later it became evident that the czar was still hoping to annex the territory which he held, and Japan, fearing for Korea, of which she considered herself the natural guardian, saw that she would be obliged to drive Russia from Chinese territory. On February 6, 1904, the Japanese representative left Petrograd, and two days later active hostilities began. For the military events of the war, see RUSSO-JAPANESE WAR.

The complete defeat of Russia in this struggle had some beneficial effects on the country. It aroused the people to a sense of the inefficiency of their government and showed them the corruption which existed in the official life of the country. This awakening had begun, however, long before the close of the struggle. Throughout the war Nicholas II had showed himself utterly unable, by reason of his vacillating disposition, to deal with the grave situation which confronted him. The reactionary class, which was completely in control, prevented the spread of education among the poorer classes, reduced the peasants to the condition of mere slaves; forced them to give most of their earnings in taxes to support the favored classes—in short, brought the country to a condition little different from that of France previous to the Revolution. The damage done to Russian trade by the war with Japan threw hundreds of thousands of laborers out of work, race wars broke out among the different peoples within the country, and everywhere demands for freedom were made.

The czar seemed at first ready to grant concessions, but the reactionary party was

too strong, and the petitions for representative government were refused. The spirit of revolt spread; peasant risings occurred; the national troops, in their attempts to quell the disturbances, were resisted by armed forces, and the crew of the warship *Potemkin* mutinied and cruised from one Black Sea Port to another. At length the czar found himself compelled to grant certain reforms and, most important of all, to promise the assembling of a representative legislative body. Mere promises of reform, however, were looked upon with suspicion by the revolutionist party, which was to be satisfied with nothing less radical than the proclamation of a democratic republic, and violent outbreaks constantly occurred in different parts of the country.

The promised legislative body, the Duma, held its first session on May 10, 1906. After ten weeks of free discussion of conditions in Russia, during which important demands were made upon the czar, amounting in substance to the relinquishment of his autocratic power and the granting of real administrative control to the people, the czar dissolved the Duma, July 21. A second Duma, elected on a greatly restricted franchise, assembled March 1, 1907, and was dissolved by the edict of the czar on June 17. The third Duma met in November, but soon adjourned to meet on June 21, 1908. This Duma was chosen as the result of the arbitrary action of the government, and did not fully represent the people. It favored the government and continued to sit until 1912. The sessions of the fourth Duma began in November, 1912. The freedom of action of the Duma, though in theory almost unlimited, was greatly lessened by the influence of the bureaucracy.

The World War. In July, 1914, affairs were approaching a crisis in Russia, and the time seemed ripe for a new revolution. Then came the Austrian attack on Serbia and Russia's defense of the small Slavic nation, the outcome of which was the opening of the European war (for details of this critical period, see *WORLD WAR*). The imminence of war overshadowed the domestic situation, and it was seemingly a united Russia that entered the struggle. An offensive in Austrian Poland (Galicia) was a brilliant success, but in the summer of 1915 the Russian troops were badly defeated by the Austro-Germans, who drove them out of Galicia, recaptured Lem-

berg and Przemyśl, forced the capitulation of Warsaw and threatened Vilna and Riga. The Russian people were roused to intense indignation by these disasters, which were the result of inefficiency and even treachery in the government. Russia was betrayed by its own officials, some of whom had been carrying on an intrigue with Germany from the beginning of the struggle. In this treasonable business the czarina herself had a hand, but the czar was probably blameless. Munitions were deliberately withheld from the troops, and there was general disorganization of all military departments.

In spite of the efforts of the traitors, a powerful organization for carrying on the war efficiently was functioning. This was the All-Russian Zemstvos Union, representing a league of all the zemstvos in the country. Under the old system Russia proper was divided into governments for local administration. Each government was divided into districts, and in the regions inhabited by the Great Russians and Little Russians each district had an elected assembly called the zemstvo. The duties of the zemstvos included the administration of charity, public health, education, etc., the construction of public works and the supervision of other matters concerning the district. These assemblies by uniting for war work accomplished miracles for the disorganized country. Up to October, 1916, the Zemstvos Union, in cooperation with other societies, had established over 3,000 military hospitals and had distributed vast quantities of supplies among the troops. The work of these societies showed the possibilities of the nation could it be freed from the paralyzing rule of the old bureaucracy. Another vital factor in the progress of democracy was the ukase of the czar prohibiting the sale and use of vodka, the national beverage. The elimination of drinking and drunkenness had much to do with ridding the people of their inertia.

Though Russia's withdrawal from the war in 1917-1918 prolonged the struggle, the country saved the day for the allies by keeping Germany and Austria occupied in the east while Britain was creating its great army. Russia had lost nearly 5,000,000 men by the end of 1916, and was then approaching exhaustion. The Pro-German elements in the government, who had helped bring about this exhaustion, were working for a separate peace with Germany early in 1917, and only

the outbreak of the revolution forestalled this allied disaster.

The Revolution of 1917. Throughout February and March strikes, food riots and mob demonstrations prevailed in Petrograd and Moscow, and on March 11 the government ordered the dissolution of the Duma. Instead of dissolving, the Duma, in the person of its president, telegraphed a defiance to the czar, and the troops began seizing the Cabinet ministers. Among those arrested was former Prime Minister Sturmer, who had been openly accused in the Duma of being a traitor. Shortly after, the Duma voted a resolution authorizing the executive council of the assembly to establish a provisional government, and on March 15 the czar was required to sign a manifesto declaring his abdication and that of the heir apparent, Alexis. On the same day a coalition Cabinet was formed, at the head of which was Prince Lvoff, organizer of the Zemstvos Union; Alexander Kerensky, Minister of Justice, represented the most powerful group, the workingmen and soldiers. Kerensky was a Socialist, but without radical tendencies.

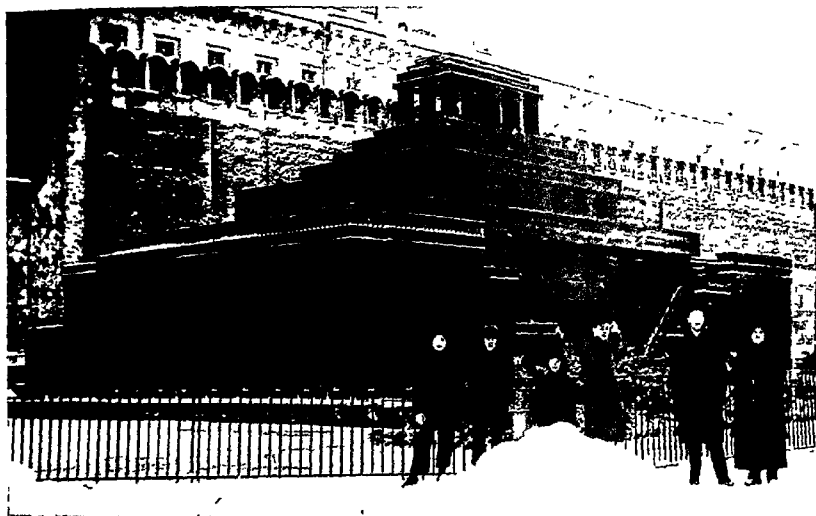
The new government endeavored to carry out a program of reform, but it was soon evident that the Cabinet was not radical enough to satisfy the masses. In May the pacifist elements forced the resignation of Milyukov, who was suspected of imperialistic tendencies. To Kerensky, who was then moved up to the position of War Minister, fell the task of organizing an offensive among soldiers who had lost all heart for fighting. The Lenin propaganda became too strong for Kerensky to overcome. On November 7, the Bolsheviks seized Petrograd, and on November 9 the All-Russian Congress of Workmen's and Soldiers' delegates named a Cabinet with Lenin as Premier and Trotzky as Minister for Foreign Affairs.

The Soviets. What may be called the Russian Soviet Republic was then established. *Soviet* means *committee*. At the time of the first revolution soviets sprang into being all over the country, in the army regiments, in the factories and in the villages. Each soviet managed the affairs of the particular group of which it was a part. When the Kerensky government fell the Bolsheviks utilized these local committees to build up a structure in which they had supreme power. All who differed from them were eliminated, and by this process Bolshevism and sovietism became

one and the same thing. At the bottom of the system are the local village soviets, which elect representatives to the district soviet on a basis of one deputy to every 1,000 population. This district soviet in turn elects representatives to the provincial soviet on the basis of one deputy to every 10,000 population.

These province soviets in turn elect representatives to the territory or state soviet, one deputy representing 25,000 population from all these country soviets. From the great city soviets delegates are elected to the All-Russian convention on a basis of one deputy for 25,000 city electors, and one representative for every 12,500 country population. This All-Russian convention of soviets is called not less than twice a year and is the supreme authority of the republic. Participation in elections is limited to those who favor Bolshevism, and all others are barred. Thus there was established a new kind of autocracy.

Later Developments. The system under which the government functioned thereafter has already been described. On his accession to power Lenin began to put his Bolshevik program into effect. In regard to domestic matters, decrees were issued placing all factories in the possession of workmen, abolishing private ownership of land, and giving to the state possession of mines, forests and waterways. As a part of his foreign policy, Lenin proposed to all the belligerents that they declare a general armistice, and he published certain secret documents stored in the Russian archives. These were treaties made between Russia and its allies, and their publication was for the purpose of persuading the people that the allies were as imperialistic as Germany. No reply having been received to his proposals to the allied belligerents, Lenin declared the Russians were justified in making peace with Germany, and on December 14 an armistice was signed at the ruined city of Brest-Litovsk, the German headquarters in the east. After several weeks of negotiation, a treaty was concluded at this place, by which Russia signed away the right to one-thirtieth of its territory and one-fifth of its population. All sovereignty over Estonia, Livonia, Courland, Poland, Finland and the Ukraine was relinquished, representing 298,650 square miles, and Russia promised to demobilize its army and to release German prisoners. It was Germany's inten-

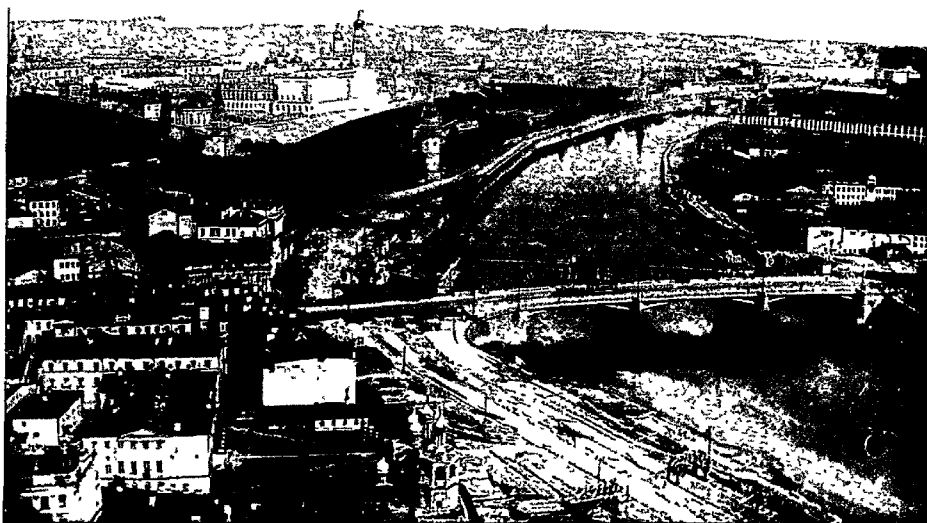


Pacific & Atlantic

DRAMATIC CONTRASTS IN SOVIET RUSSIA

Above Lenin's Mausoleum in the Red Square, Moscow It is built of the finest marble, a speakers' platform on top

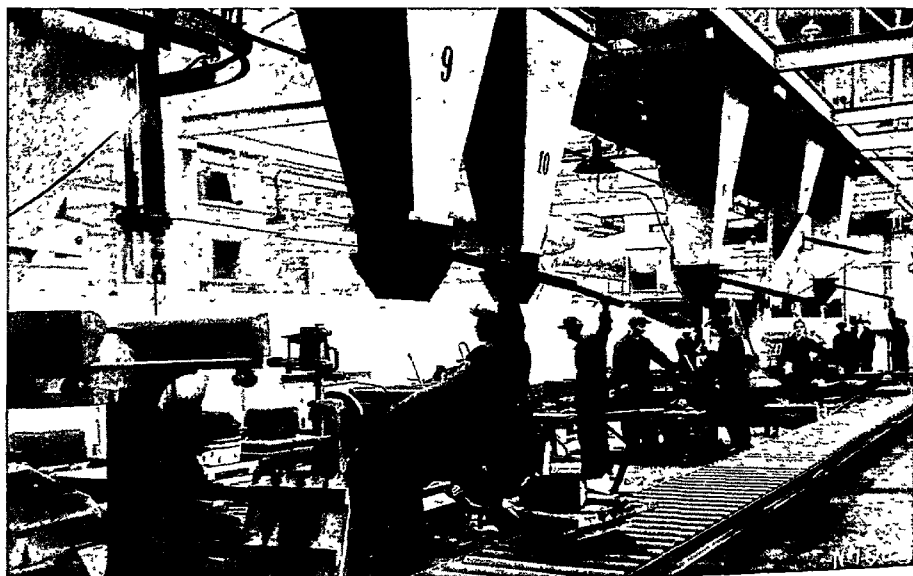
Below. A group of peasant voters assembled in village hall for Soviet elections



Acme

A PANORAMA OF MOSCOW, RUSSIA

With the Moscow River, and towers of the Kremlin in the left background



U & U

INTERIOR, MODERN TRACTOR FACTORY IN RUSSIA

The molding stations, and overhead sand hoppers, between two conveyor lines.

Outline of the Government of Russia and of the Union of Socialist Soviet Republics

RUSSIA PROPER

Local Soviet.

Handles local government on orders from above

Rural District Congress.

Deputies from village soviets, monthly meetings

County Congress:

Not more than 300 members, meets quarterly

Provincial Congress

Not more than 300 deputies, each of the congresses, except the ones lower than this, controls the one subordinate to it

Regional Congress:

Not more than 500 deputies

All-Russian Congress of Soviets:

Over 2000 members, annual sessions; chief function is to select and hear reports from Central Executive Committee

Central Executive Committee:

386 members, holds bi-monthly meetings, responsible collectively to All-Russian Congress but supreme during its adjournment When not in session, its powers are exercised by the Presidium

Council of People's Commissars.

Includes administrative heads of departments responsible individually and collectively to Central Executive Committee and contains most important members of that body Its chairman (equivalent to Premier) has only authority to settle disputes

Departments and Services:

Under the Council of People's Commissars are the various services and departments of government corresponding to Cabinet ministries in other countries

The departments local to Russia Proper are those of the Interior, Social Welfare, Health, Justice, Education and Agriculture.

Those under Union supervision are Workmen's and Peasants' Inspection, Finance, Labor, Trade, Economy and Statistics

Commissars responsible to the Union are those of Foreign Affairs, War and Marine, Communications, Posts and Telegraphs

U. S. S. R.

The Russian Socialist Federated Soviet Republic (Russia Proper):

All autonomous republics and areas, except the six named below, which came into U S S R by treaty, are included in Russia Proper, which also contains most of Siberia

The six republics, federated with Russia Proper, are

Ukraine S S R., bordering Rumania
Uzbekistan S S R., near Afghanistan
Tadjikistan S S R., in Central Asia
White Russia S S R., bordering Poland
Turkmenistan S. S. R., bordering Persia
Trans-Caucasian S. F. S R., including Georgia, Armenia and Azarbaijan

The federation of Russia Proper and the other six Soviet Republics is effected by the organization of the

Union Congress of Soviets, the members of which are elected by provincial congresses in member republics Responsible to the Union Congress is the

Union Central Executive Committee, composed of 131 members, representative of the important nationalities, and 450 members apportioned according to population of member republics This Executive Committee selects the

Union Council of Commissars, a counterpart of the Russian Council This is the administrative ministry of U. S. S. R. and includes the following

Departments or Ministries:

Foreign Affairs, War and Marine, Foreign Trade, Transport, Posts and Telegraphs, Workers' and Peasants' Inspection, Labor, Food, Finance, and Economy

tion to make all the relinquished provinces German principalities, and only its own defeat, a year later, defeated this plan. The Treaty of Brest-Litovsk, which was a terrible blow to the allies, was ratified by a congress of soviets at Moscow, in March, 1918.

The subsequent history of Russia (Russian Socialist Federated Soviet Republic) is that of an attempt to impose a communist governmental régime on a nation of 165,000,000 people, mostly of peasant stock, more than 50 percent of it illiterate. Repudiation of Russia's pre-war obligations lost the support of foreign countries. Lenin gained complete control of the State, and after his death in 1924 his memory was held in reverence by the people. Joseph Stalin succeeded him as chief of the State, though without official title for several years. In 1929 a vast program of development of agriculture followed the previous attempt to develop industries in the cities and towns. State and collectivized farms were organized, in which the small peasant holdings were merged, under a plan of full development of all farm resources in a five-year period. All labor both in factory and on the farm was mobilized by the power of the central authority, with severe penalties for failure to work according to decree.

In 1933 a second five-year plan of development was announced. In November, 1933, the United States government granted recognition to Russia, and Wm. C. Bullitt was named first ambassador to the Soviet Union.

Related Articles. Consult the following titles for additional information:

CITIES	
Archangel	Moscow
Astrakhan	Nizhni Novgorod
Baku	Odessa
Ekaterina	Petrograd
Kazan	Reval
Kharkov	Riga
Kiev	Sebastopol
Kishinev	Tiflis
Kronstadt	Vilna
Minsk	Vladivostok

GEOGRAPHICAL DIVISIONS		
Bessarabia	Estonia	Lithuania
Bokhara	Finland	Poland
Circassia	Georgia	Siberia
Courland	Livonia	Turkestan
Crimea	Ural	Ukraine

LAKES	
Ladoga	Onega

RIVERS		
Dnieper	Don	Vistula
Dniester	Neva	Volga

HISTORY	
Alexander, I, II, III	Lenine, Nikolai
Berlin, Congress of	Nicholas, I, II
Bolsheviks	Nihilists
Catherine I, II	Paul I
Cossacks	Peter I
Crimean War	Russo-Turkish Wars
Holy Alliance	Trotsky, Leon
Ivan, III, IV	World War

RUS'SO-JAPANESE' WAR, a war between Russia and Japan, beginning in February, 1904, and continuing until September, 1905. The chief cause of the conflict was Russia's attempt to gain control of Manchuria and Korea, and thus make its position in the Far East so strong that it could dominate Japan. At the close of the war between China and Japan in 1895, Japan had won control of Formosa and Liao-tung Peninsula, including Port Arthur. The leading European nations, however, forced Japan to cede Liao-tung back to China, and Russia immediately leased this peninsula. Russia had already gained control of Sakhalin Island, had completed the Trans-Siberian Railway and established ports at Vladivostok and Port Arthur, notwithstanding the repeated protests of Japan, which saw its very existence threatened by these movements.

Resources of the Combatants. Russia was far superior to Japan in numbers and material, but Japan had the better trained army. Moreover, while Russia had about 80,000 troops at the seat of war, Japan had over 200,000 at hand, while it required weeks and months for Russia to ship men and supplies from Petrograd (Saint Petersburg) to the front, Japan could render its armies in the field all possible assistance in a few hours' notice. It was Russia's policy, therefore, to delay engagements until reinforcements from Europe should arrive. On the other hand, it was Japan's policy to strike at once.

Siege of Port Arthur. From the first, the capture of Port Arthur was the chief objective of the Japanese. The first attack was made by Vice Admiral Togo, on February 8, 1904. The Russian fleet suffered great damage, and the Russian forces withdrew to the land forts. Port Arthur was blockaded, and the Russian general Kuropatkin was dislodged from his position and retreated towards Mukden. At the close of a five-days' battle in October, the Russians again retreated. After a number of attempts to capture Port Arthur by storm, the Japanese through trench warfare compelled the city to surrender January 2, 1905.

Other Engagements. There were no important engagements about Mukden until February 20, 1905, when the Japanese advance began. The series of engagements known as the Battle of Mukden constituted the greatest land battle of history previous to the World War. Over 700,000 men were

engaged, and the line of battle extended over eighty miles. The Japanese were reinforced by troops from Port Arthur under General Nogi, and were finally victorious. The naval battle in the Sea of Japan, May 27 and 28, resulted in the destruction of the Russian fleet.

Treaty of Peace. In June, 1905, President Roosevelt, voicing the sentiment of almost all nations, suggested to the combatants the advisability of ending the struggle, and in August of that year the peace convention met at Portsmouth, New Hampshire. The treaty, which was signed on September 5, gave Port Arthur to Japan, made it supreme in Korea, allowed it important railway privileges in Manchuria and ceded to it the southern half of Sakhalin Island. One of the most important results of the war for Japan was the raising of that nation to a first-class power.

RUSO-TURKISH WAR, the war between Russia and Turkey in 1877 and 1878. For some years Russia had been looking for an opportunity to retake the territory lost in the Crimean War, and the massacre of Christians in

Bulgaria in 1876 offered a pretext for again making war on Turkey. Russia declared itself the defender of the Christians in the Balkan provinces, and began the war in 1877. The rout of the Turks at Philippopolis and the capture of Plevna were the only important engagements. Russia resorted to modern methods of warfare, and in a few months wore the Turks out. The war was ended by the treaty of San Stefano, which was very favorable to Russia. However, the other great powers, England, France and Germany, felt that the treaty gave Russia more

power than could safely be given that country, and the Congress of Berlin was called to modify the terms of the treaty. See BERLIN, CONGRESS OF.

RUST, the brownish-red substance that forms on the surface of iron and steel when they are exposed to damp air, or to the action of air and water. When the name is used without any explanation it means *iron rust*. It is an oxide of iron. Rust may be removed from iron or steel by polishing with emery or some other powder. If a deep coat is formed, however, a file, a grindstone or an



THE RUSSO-JAPANESE WAR
Showing battles and rearrangement of
boundaries

emery wheel may be necessary. Yellow spots formed on linen by iron rust may be removed by soaking the fabric in a weak solution of oxalic acid and then washing it, though a strong solution of this acid is likely to weaken or destroy the fabric. Sometimes lemon juice will remove the spots.

RUSTS, minute fungi that attack the leaves and stems of certain plants and cause extensive damage to wheat and some other crops. These fungi take their name from the resemblance of the disease they produce to iron rust.

Rust may be said to begin with little black dots and lines that appear on the surface of the stem late in summer. These lines are the innumerable spores which constitute the form in which the plant survives the winter, or its rest period. In spring each spore begins to grow, but after a little, it will die, unless in some way it is carried to the barberry bush. Upon the leaves of that shrub the growing spores thrive lustily, and soon they grow to be long chains of little fringed cups, on the lower side of the leaves. These cups produce a different kind of spores, which are carried by the wind, or in some other way, to wheat or grass or some cereal, where they force their way into the pores of the leaves and mature the blight spores that spoil the fruit. A field infected with rust should not be planted to the same crop the second season. After the harvest the stubble and straw should be burned and the ground thoroughly plowed. A tillage crop, such as corn or potatoes, assures the destruction of the spores.

RUTH, Book of, a book of the Old Testament, between *Judges* and *Samuel*. It gives a beautiful picture of the domestic life and customs of the Israelites of that period. Ruth, the heroine, who gives the name to the book, by her marriage with Boaz, a wealthy landowner of Bethlehem, became the grandmother of David, and one of the ancestors of Jesus. The name of the writer and time of writing are unknown. For the detailed story of Ruth, see *BIBLE*, subhead *Bible Stories*.

RUTHENIANS, or **LITTLE RUSSIANS**, the name applied to the Slavs inhabiting Southern Russia and Austria on both sides of the Carpathian Mountains. They number about 20,000,000, about one-fourth of whom are in Galicia. They are short of stature, and have brown hair and eyes. They speak the Russian language, and most of them belong to the United Greek Church. Agriculture is

about their only occupation, and they employ methods and implements long since discarded by more progressive peoples. For the position of the Ruthenians at the close of the World War, see *Galicia*.

RUTILE, *rutile*, a brownish-red mineral that forms hairlike crystals in transparent quartz. It also occurs in brown masses. Rutile is found in the largest quantities in Sweden, in the Ural Mountains, and in the United States. It is used for coloring glass and porcelain a yellow tint. Transparent quartz containing rutile forms attractive cabinet specimens. Some of the finest specimens are polished and set, making beautiful gems.

RUTLAND, Vt., the county seat of Rutland County, fifty-six miles southeast of Montpelier, on the Otter Creek and on the Rutland and the Delaware & Hudson railroads. There is an airport. The city is situated near lofty and picturesque peaks of the Green Mountains and in a region containing very extensive deposits of marble. Iron ore, fire clay and slate are also found, and the city has the largest scale works in the world, railroad shops, lumber mills, machine shops, boiler and engine works and other factories. The prominent buildings include Memorial Hall, a courthouse, a Federal building, public and Baxter libraries, the house of correction, a Knights of Pythias Home and a hospital. The place was settled about 1770. From 1784 to 1804 Rutland was one of the state capitals, and the state house, constructed in 1784, is the second oldest building in the state. During the Revolution two forts were erected here. The city was chartered in 1892. Population, 1920, 14,954, in 1930, 17,315, a gain of 15 per cent.

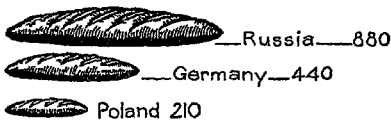
RUTLEDGE, *rut'lej*, JOHN (1739-1800), an American statesman and jurist of Revolutionary days, first governor of the state of South Carolina. He labored earnestly for the independence of the colonies, both in his native state and in Congress. He represented South Carolina in the Stamp Act Congress, and in the Constitutional Convention was a warm supporter of the Federal Constitution. Rutledge was appointed one of the first justices of the United States Supreme Court, but later resigned this position to become chief justice of the supreme court of South Carolina. In 1795 Washington appointed him Chief Justice of the United States Supreme Court, but Rutledge's mind giving way, the appointment was not confirmed.

RUYSDAEL, or **RUISDAEL**, *roys'dahl*, JACOB VAN (1625-1682), the foremost of Dutch landscape painters. He was born at Haarlem, and spent much of his life at Amsterdam, where, between 1660 and 1675, his best work was done. During his lifetime his work was not highly valued, and he died in an almshouse. Although he painted views of the sea and coasts, most of his subjects were quiet waysides and lovely forest glades. Unlike most landscape painters, his object was not to reproduce particular scenes, but to produce a beautiful composition made up of various elements gathered promiscuously; thus his canvases are a sort of idealization of nature. Among the fine examples of his work are *Landscape with Ruins* (National Gallery, London); *Storm at Sea* (Louvre); *Cottage Under Trees*, *Wheatfields* and *Forest Stream* (Metropolitan Museum, New York).

RYAN, ABRAM JOSEPH (1839-1886), an American Roman Catholic priest and poet. Soon after his ordination Father Ryan became a chaplain in the Confederate army and served until the war closed. Afterwards he edited *The Star* and *The Banner of the South*, both Roman Catholic weeklies. Subsequently he was in charge of a parish in Mobile, Ala., where he remained until 1880. His best known poems are *The Conquered Banner*, written at the close of the Civil War, *The Lost Cause*, and *The Flag of Erin*.

RYE, a grain closely related to wheat and barley. It originated in Siberia, and is raised farther north than any other grain. For centuries rye has been one of the most important food plants. It has been cultivated in Asia and Europe since time immemorial. It thrives in climates and in soils which forbid wheat, requires less manure and ripens faster. It is extensively grown in northern Europe, and rye bread forms an important article of food for the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland, and Prussia. Unmalted rye meal, mixed with barley malt and fermented, forms the mash whence is distilled the spirit known as Holland gin

(See GIN). The straw is long and flexible, does not rot easily and is used by brick-makers and thatchers, also for stuffing horse collars and mattresses and for making baskets, straw hats, and bonnets. A fungus



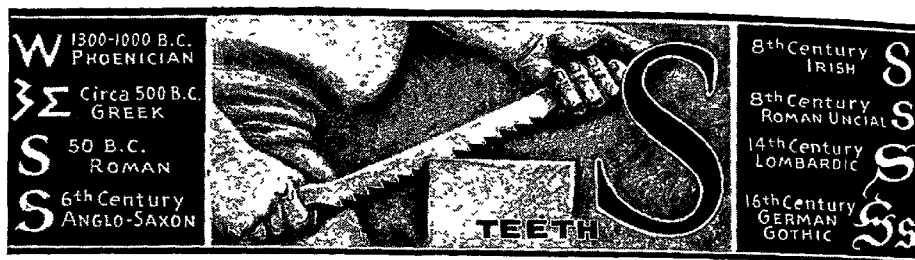
 France 44  United States 40
Figures Represent Millions of Bushels

PRINCIPAL PRODUCING NATIONS
sometimes grows on rye, causing the disease known as ergot, which makes rye so infected dangerous for food. See ERGOT.

A good crop of rye yields from twenty to thirty bushels of grain per acre. Before its revolution, Russia was the greatest rye-producing country in the world. The average annual production of this grain in the United States is about 70,000,000 bushels, with a yield approximately of sixteen bushels per acre.

RYE HOUSE PLOT, a conspiracy planned by some of the most radical of the English Whigs in 1683 to assassinate Charles II, on his return from the races at Newmarket. The plot was to have been executed at Rye House, a farm on the road to London, and from this fact the plot derived its name. Charles left Newmarket several days before he was expected to, and the plot failed. The conspiracy was afterwards detected, and Lord William Russell and Algernon Sidney were beheaded, though their connection with the plot was not proven. The Earl of Essex, another of the conspirators, committed suicide in the Tower of London.

RYSWICK, *ri'swik*, TREATY OF, a treaty negotiated between France and Great Britain on one side and Spain and Holland on the other, Sept. 20, 1697. This treaty ended the nine years' war between Louis XIV and the Grand Alliance and restored to the respective countries all conquests made in America and the East Indies during the war. The village of Ryswick is near The Hague.



S, the nineteenth letter of the English alphabet. The corresponding letter of the Phoenician alphabet had somewhat the form of a *w*, which in Greek was turned on edge, gradually becoming rounded into its present form. *S* has a two-fold pronunciation—the sharp, or sibilant, character, as in *sack*, *sin*, *this*, *thus*; and the soft or sonant, *z* sound, as in *muse*, *flies*. In certain words, as *fissure*, *sugar*, *passion*, it has the sound of *sh*.

SAAR VALLEY, a German district bordering on France, about 740 square miles in area, exceedingly rich in coal. After the World War, the Treaty of Versailles placed its mines at the disposal of France for fifteen years to compensate that country for the coal taken by Germany when it held French territory during the war. Throughout the period from 1920 to 1935 administration of the Saar was in the hands of the League of Nations.

The Versailles treaty stipulated that in 1935 the inhabitants of the region should decide by vote whether they wanted to be reunited to Germany, preferred to be joined permanently to France, or wished to continue under rule of the League. The vote almost unanimously asked for a return of the territory to Germany. It was stipulated that the area should remain a part of the demilitarized zone established by the treaty, but in 1936 the German government nullified this provision by adding full military control to its civil authority.

SABATINI, *sab ah te'ne*, **RAFAEL** (1875–), an Italian novelist who upon marriage to a woman in London became a British subject. He wrote most of his books in English, and won high appreciation in the English-speaking world. Probably his best-known book was *Scaramouche*; only a little less famous were *The Sea Hawk*, *The Lion's Skin*, and *The Gates of Doom*.

SABBATH, *sab'ath*, the Hebrews' divinely

appointed day of rest and worship. The origin of the Sabbath is given in the Bible in the second chapter of Genesis:

"And on the seventh day God ended his work which He had made, and He rested on the seventh day from all His work which He had made. And God blessed the seventh day and sanctified it."

In the Ten Commandments the Israelites are expressly commanded to observe the Sabbath, in the words: "Thou shalt observe the Sabbath day to keep it holy." For centuries this commandment was obeyed to the letter. No work was allowed, and one could not travel farther than a Sabbath-day's journey, a little less than a mile, from the city. The Pharisees added many trivial rites and ceremonies to Sabbath observance, and at the coming of Christ they placed greater emphasis on the letter than the spirit of the law. Christ taught that it was lawful to do good on the Sabbath, and that the Sabbath was made for man, and not man for the Sabbath.

As every seventh day among the Jews was a day of rest for man, so every seventh year was a year of rest for the land, and was known as the *Sabbatical year* of release for Jewish debtors.

Sunday. Saturday is the Sabbath of the Jews and a few minor Christian sects, but the Christian Church in general observes Sunday, or the first day of the week, as a day sacred to rest and worship. There is no reference to the Sabbath in the New Testament, except in the Gospels, but there are numerous references to the first day of the week. Since this was the day on which Christ rose from the dead the Christians adopted it as their Sabbath, and its observance as a day of rest and worship, or as the Lord's Day, has become general.

SABINES, *sa beens'*, an ancient Italian people, allied to the Latins, and an important nation before the foundation of Rome. They

were a brave, religious race, confined to the mountain districts to the northeast of Rome. According to legend, the daughters of the Sabines were seized and carried off by the early Roman youths for wives while they were being feted at a great festival. When the Sabines were dissuaded by the Romans from waging war upon them, the two nations united in 290 B. C., the Sabines settling on Quirinal Hill. See **ROME**, **HISTORY OF**.

SABLE, a small fur-bearing animal, a native of Siberia. It is akin to the American sable and the pine marten. It averages a foot and a half in length, and has a bushy tail and glossy brown fur. The animal makes its home in rock crevices and in trees, and



SABLE

is very wary and difficult to capture. Nuts and such small animals as squirrels, birds and mice constitute its food. Sable fur is one of the most valuable of all commercial furs, a single small pelt sometimes bringing \$200. A coat made of sable of fine quality is worth several thousand dollars.

SABOTAGE, *sab o tahzh'*, a French term derived from *sabot*, meaning a *wooden shoe*, or to *cut shoes*. Since 1887 the meaning has been extended by certain labor organizations to apply to damaging or destroying the property of an employer by workmen, who take this means instead of strikes for securing their demands. Sabotage takes various forms. Among the most common are damaging machinery by putting sand in the bearings, cutting logs shorter than the required length and sawing boards thinner than the required dimensions, mslaying tools, and thus causing delay; using poorly prepared material in building, working so slowly and accomplish-

ing so little that the employer suffers loss—in short, doing anything in secret that will annoy the employer and reduce his profits. In nearly all cases it is very difficult to detect the malefactors.

Sabotage is repudiated by all reputable labor organizations, but it is upheld by the Syndicalists in Europe and by the Industrial Workers of the World in America. See **SYNDICALISM**, **INDUSTRIAL WORKERS OF THE WORLD**.

SAC, or **SAUK**, a tribe of the Algonquian family of Indians, whom the French explorers found in Northern Wisconsin in the latter part of the seventeenth century. They, with their kindred, the Foxes, were gradually driven south by the Ojibwa, and the two tribes formed a confederation. Both the Sacs and Foxes were noted for their hostility to the whites. Black Hawk, one of their chiefs, was one of the most famous Indians in history. Both tribes were driven westward and nearly exterminated, though a few still live in Kansas and Oklahoma. See **BLACK HAWK**.

SACCHARIN, *sak' a rm*, a white powder five hundred times sweeter than cane sugar. It was made known to the world in 1879 by Dr. Constantin Fahlberg of Germany and Prof. Ira Remsen, a noted American chemist. Although the sweetening power of saccharin is much greater than that of sugar, it does not contain as much nourishment. It is not fermentable and is used in the treatment of certain diseases, such as diabetes, and in many cases in which the palate craves for sweets, but in which ordinary sugar cannot, without danger, be permitted. Saccharin is extensively used in the manufacture of confectionery and cordials, in baking and in preserving fruit. It is usually sold in tablets.

SACHS, *zahks*, **HANS** (1494-1576), Germany's most distinguished sixteenth-century meistersinger and poet, born at Nuremberg. He learned the trade of a shoemaker, and after four years' wandering throughout Germany as journeyman to his trade, he returned to his native city, where he remained until his death. He was most prolific, having written almost 7,000 meistersongs, dramas, narratives, fables, and hymns, one-fourth of which are in print. Sachs succeeded in imparting to his hymns a spiritual feeling which considerably aided the spread of the Reformation.

SACRAMENT, in the Christian churches, the observance of a solemn rite, varied somewhat as to form, for the purpose of bringing the worshiper into closer communion with God.

SACRAMENTO, *sak ra men'toh*, CALIF., the capital of the state and the county seat of Sacramento County, is situated on the Sacramento and American rivers, ninety miles northeast of San Francisco. It is served by the Southern Pacific and the Western Pacific railways, and by an extensive system of electric interurban lines. The city occupies a low plain bordering on the river, and is surrounded by a fertile and beautiful country. There are Mather Field and Municipal airports.

The state capitol, completed in 1869 at an expense of \$2,500,000, is the most prominent structure in the city. It stands in the center of a park of thirty-four acres, beautifully laid out in walks, lawns and flower beds, interspersed by many rare and beautiful trees. A number of additional buildings have also been erected for state use. Other public buildings of note include a Federal building, a city hall, a courthouse, the Crocker Art Gallery, a Y. M. C. A. building, the Trust Exchange, the Foresters', Masonic, Elks' and Odd Fellows' buildings, the Forum, the Sutter and Women's Clubs and a large number of fine hotels.

Sacramento has several parks, whose combined area exceeds 1,000 acres. These include Capitol Park, McKinley Park, South Side, Del Paso and a number of smaller areas. The grounds of the State Agricultural Society adjoin the city, and the annual state fair is held there. Among the educational institutions are the State Library, one of the largest on the Pacific coast, the Public Library, the Odd Fellows' Library, the Christian Brothers' College, Howe's Academy and Saint Joseph's Academy. The leading benevolent institutions are the Marguerite Home, the Protestant Orphan Asylum, the County Hospital and the hospital of the Southern Pacific Railway.

Sacramento is in one of the most fertile agricultural regions of the state, and it is the distributing point for large quantities of fruits and agricultural produce. Some of the largest industrial plants are connected with the handling of fruit. The manufactories include flour and grist mills, canneries, foundries and machine shops,

meat-packing establishments, and manufactories of brick and tile, furniture, soap and other commodities. The repair shops of the Western Pacific and the Southern Pacific railways are located here; they employ several thousand men.

The first settlement was made by Captain John A. Sutter in 1839. Two years later Captain Sutter built a fort and named the place New Helvetia. In 1848 the name was changed to Sacramento and the first lots for the town were sold. During the early fifties Sacramento was an important distributing point for the gold mines in the surrounding country and was connected by stage with Stockton, Maryville and several other places. It became the capital in 1854, and two years later the first railroad reached the city. During its early days the city suffered several times from floods, but later the low land was raised and the city was protected by dikes. Several disastrous fires have also occurred. However, the city has recovered from each of these disasters and has continued to grow and to increase in commercial importance. Population, 1910, 65,908; in 1930, 93,750.

SACRAMENTO RIVER, the largest river in California, has its source on the western slope of Mount Shasta and flows south into Suisun Bay. It is 600 miles long, and is navigable for 300 miles for small boats, and to Sacramento, the only large town on its banks, for larger vessels. Its chief tributaries are the Pitt and the San Joaquin. The Pitt is sometimes called the Upper Sacramento. The Sacramento flows through a fertile region and waters a beautiful and fruitful valley.

SACRED COLLEGE, or COLLEGE OF CARDINALS, the entire body of cardinals in the Roman Catholic Church. The cardinals are appointed by the Pope, and they assist him in managing the affairs of the Church. At present there are seventy, but the number has varied from time to time. The Sacred College is a corporate body, with an income of its own. Its most solemn duty is, upon the death of the Pope, to elect his successor. During the election the members are excluded from intercourse with the public. See CARDINAL; POPE; ROMAN CATHOLIC CHURCH.

SACRIFICES, *sak'ri fi ses*, gifts offered to a god in thanksgiving, for the purpose of communion or to secure atonement for sin. The idea underlying sacrifices is that worship

should consist in something more than words, the giving of something dear to the worshiper. Among the ancients sacrifices were often offered to counteract the wicked disposition of a god or to turn aside his wrath.

The sacrifices offered by the Jews are the most noteworthy. They were of two types—the bloody, and those without blood—that is, animal sacrifices and sacrifices of the fruits of the land. The animal offerings included the *burnt offering*, a lamb, male, without blemish, offered twice daily for the people, in the name of the nation; the *peace offering*, a lamb or goat, male or female, without blemish, offered by families at new moons, or on special occasions of thanksgiving; and the *guilt offering* made by individuals for cleansing from sin, and, once a year by the High Priest, on Atonement Day, for the sins of the nation. Details of the sacrifices are found in the book of *Leviticus*. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practiced human sacrifices, and similar usages widely prevailed throughout the world.

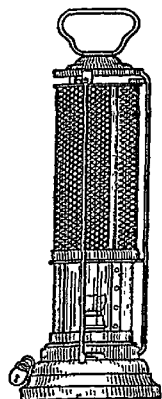
SADDLE, a seat placed on a horse's back for the rider. In early ages, the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin. The construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side-saddles, for ladies.

SADDUCEES, *sad'u sees*, one of the two chief sects or parties among the Jews at the time of Christ. The sect had its origin among the aristocracy, and most of the high offices were held by its members. The high priests Annas and Caiaphas were Sadducees. Josephus, the Jewish historian, said of them: "They had only the rich on their side, but not the common people." A constant feud existed between the Pharisees and Sadducees. The latter adhered to the Law of Moses, but rejected the oral law, they denied the resurrection of the dead, and did not believe in angels and spirits. After the destruction of Jerusalem by Titus, the Sadducees disappeared. See PHARISEES.

SADOWA, *sah'doh vah*, **BATTLE OF** (also known as the Battle of Koniggratz), a battle fought July 3, 1866, between the Austrians and the Prussians in the village of Sadowa, in Bohemia, the Austrians suffering defeat. It was the decisive engagement of the Seven Weeks' War, and as a result Prussia became the leading state of the North German Confederation and ultimately of the German Empire. See SEVEN WEEKS' WAR.

SAFE, a steel box, used to protect valuables from fire and burglars. Safes have double walls of steel, with a space between, usually six or eight inches wide, filled with some substance which does not readily conduct heat. Most compositions used for this purpose contain clay, gypsum and alum, or some similar substance. Sometimes the space contains bottles filled with water. In case of fire the water forms steam, which protects the inner wall from heat. The outside casing of a safe is made of very hard steel, and the plates and doors are fitted with the greatest care, so as not to admit even of the finest pointed tool to the joints. The door is fastened by a combination lock, which is manipulated by the turning of a dial. When the door is locked and the combination is manipulated, the door cannot be opened until the necessary number of turns have been given to the indicator. Safes used in banks always have the time for opening regulated by a clock, and are considered more nearly proof against burglars than safes without this device. The modern vault is a large safe built up of alternate layers of steel plates.

SAFETY LAMP, a lamp for lighting coal mines without exposing the miners to the explosion of a gas called *fire damp*. The first safety lamp was invented by Sir Humphry Davy in 1816, and until quite recently his pattern, with some slight modifications, was in general use. It consists of an ordinary oil lamp, surrounded by a cylinder of wire gauze of fine mesh, which is locked over the lamp after it is lighted. The heat of the flame will not pass through this



SAFETY LAMP

gauze screen and ignite the gas outside until the gauze has become as hot as the flame, and it will not become so heated before the miner has time to withdraw from the chamber. The presence of fire damp can be detected by lowering the wick, when a pale blue flame will be noticed above the flame of the lamp if the gas is present. A prudent miner, observing this warning, will immediately withdraw from the locality. There are several patterns of safety lamps in use, but they all depend upon the principle of Davy's lamp. See FIRE DAMP.

SAFETY VALVE, an appliance attached to steam boilers to regulate the pressure of steam. The safety valve consists of a steel or iron stopper that fits an opening in the boiler somewhat as a cork fits the mouth of a bottle. The valve is held tightly in place by weights attached to a lever or by a spring. In either case the valve is gauged to open at a pressure several pounds below what the boiler is estimated to carry with safety. When the steam reaches the pressure at which the valve is gauged, it opens and some of the steam escapes; the pressure therefore cannot increase above this point. Boilers of locomotives and steamships carry safety valves regulated by a spring, but those on most stationary boilers are gauged by weights. Weights are preferred by engineers because their pressure is constant, while the pressure of springs may vary. See BOILER.

SAFFLOWER, *saf'lou er*, a large, thistle-like plant, with orange-red flowers, cultivated in China, India, Egypt and Southern Europe. Its modern use as a dyestuff has largely been replaced by aniline dyes, and it is now most generally employed in the preparation of rouge and to adulterate saffron. In India an oil for fuel and cooking purposes is pressed from the seeds.

SAFFRON, *saf'run*, a low, bulbous plant, with grasslike leaves and large, crocuslike purple flowers, cultivated in the East and in Southern Europe for the sake of its stigmas. These, when dried, form the saffron of commerce, which has a deep orange color, a warm, bitterish taste and a sweetish, penetrating odor. As it takes the stigmas of more than four thousand flowers to yield an ounce of saffron, it has always been very expensive. Its orange-red extract is used by painters and dyers, but this is now generally displaced by cheaper coloring matters. Saffron itself is employed in cookery and confectionery as a

coloring and flavoring substance. It is no longer regarded as a drug and is of little value for medicinal purposes among the most advanced physicians.

SAGAS, *sah'gas*, or *sa'gas* (tales), the name given among the Icelanders to a class of prose epics—historical, mythical or romantic in context—tracing in detail events in the lives of Icelandic heroes and rulers. Originally they were composed for oral recitation on festive occasions, and before the twelfth century were preserved only in the memories of the people, which accounts for the varying versions of the same events. Between the twelfth and fifteenth centuries many of these detached tales were collected, amplified or curtailed, and worked into a series of consecutive narratives.

The sagas of the west of the island are the more elegant in style, probably because of Celtic influence. Among the more important sagas are the *Saga of Gísli*, the outlaw; that of the hero and poet Egill; the *Laxdœla Saga*, the story of the Icelandic heroine Gudrun; the *Saga of Grettir the Strong*, and the *Saga of Njal*, a complex saga of great legal and historical value. A number of the most interesting sagas are to be had in English translations, but their authorship in many instances is unknown.

SAGE, *sayj*, a perennial garden herb, cultivated for its leaves and stems, which contain an essential oil, valuable as flavoring. It grows in temperate and warm regions, in dry soil, and may be propagated by slips or cuttings. In some sections of the United States a tea made from sage leaves is drunk as a tonic and as an aid to digestion. The plant has a much wider use as a flavoring. The best known species, the common *garden sage*, is a little shrubby plant, with rough, grayish leaves and small bluish flowers. *Meadow sage* is common in meadows of both Europe and America.

SAGE, RUSSELL (1816-1906), an American financier, born at Shenandoah, N. Y. He was reared on a farm, received a public-school education and in his young manhood held various minor political offices. From 1853 to 1859 he was a Whig member of Congress, and soon afterwards he moved to New York and became associated with Jay Gould in railroad operations. He left his entire fortune of \$50,000,000 to his wife, Margaret Olivia Slocum Sage, to be used by her without restriction.

Margaret Olivia Slocum Sage (1828-1918), wife of Russell Sage and one of the foremost of American philanthropists. She was born at Syracuse, N. Y., and educated at Troy Female Seminary. In 1907 she established, the Russell Sage Foundation, "for the improvement of social and living conditions in the United States," and endowed it with a fund of \$10,000,000. Out of this fund model apartments have been erected in New York to replace tenements, and much reform work along social and educational lines has been financed; a model community has been established on Long Island and an island has been purchased in the Gulf of Mexico for the protection of birds. At her death Mrs. Sage left practically all of her estate to the furtherance of philanthropy and education. See **RUSSELL SAGE FOUNDATION**.

SAGEBRUSH, the name of a group of dry shrubby plants, belonging to the composite family. Sagebrush is the characteristic vegetation of the arid and desert regions in the western part of the United States, and in some localities it forms the only vegetation found on large areas. There are several varieties, known as *black sage*, *white sage* and *silvery sage*, but all bear the same general characteristics. The plants grow from six to twelve feet high, and have a straight, stiff stem bearing a profusion of small wedge-shaped leaves and clusters of small flowers at the top of the branches.

Nevada is popularly known as the *Sagebrush State*, because of the large portions of the state covered with this plant.

SAGE GROUSE, the largest of American grouse, yet found on the sagebrush plains of Western North America and in mountain valleys. When fully grown it is about two and one-half feet in length. On each side of the neck of the male is an inflatable sack, like that of the prairie chicken (see **GROUSE**). The flesh of the sage grouse is usually tainted by its food, which renders the taste unpleasant.

SAGHALIEN. See **SAKHALIN**.

SAGINAW, MICH., fourth city in size in the state, the county seat of Saginaw County, sixty-five miles northeast of Lansing and 100 miles northwest of Detroit, on the Saginaw River, at the head of deep-water navigation, eighteen miles from Saginaw Bay, and on the Grand Trunk, the Pere Marquette and the Michigan Central railroads. The educational institutions include two high schools, a free manual training school, a trade

school, and the Hoyt and the public libraries, a natatorium and an auditorium. The city contains the Saginaw, Saint Mary's, Women's and the detention hospitals, a home for the friendless and Saint Vincent's Orphanage. Some of the other prominent buildings are the courthouse, the postoffice, the city hall, the Masonic Temple, Y. M. C. A. and Y. W. C. A. and an Elks' Temple. There is an airport.

Saginaw was formerly one of the greatest lumber-manufacturing centers in the country, and it still has a very extensive lumbering industry. The future of the city depends chiefly upon the extensive coal fields and upon the rich agricultural country, which is especially productive of sugar beets. There are also valuable salt deposits in the vicinity. The city contains beet-sugar mills, glass works, iron, steel and wood-working factories, furniture, steering gears, silos, flour mills and a large number of wholesale houses. The town was laid out in 1836, and was incorporated in 1851. Saginaw was created in 1890 by the consolidation of Saginaw City and East Saginaw, which are on opposite sides of the river. The city adopted the commission form of government in 1914. Population, 1920, 61,903; in 1930, 80,715, a gain of 30 per cent.

SAGITTARIUS, *saj i ta'ri us* (the archer), a southern constellation or sign of the Zodiac, represented by the Archer's arrow and part of the bow (♐). The sun in its revolution enters the sign of Sagittarius about November 22.

SA'GO, a food-starch obtained from the trunk of several species of palms which grow in the East Indies. The palm from which



SAGO PALM

the finest sago is prepared forms immense forests on nearly all the Moluccas, each stem

yielding from about 500 to 800 pounds of sago. The tree is about thirty feet high and from eighteen to twenty-two inches in diameter.

The trees devoted to the production of sago are not permitted to come to full maturity, as the ripening of the fruit saps the starchy center, leaving the trunk a hollow shell, which kills the tree. The tree is cut down just before its first flowers appear; it is then about fifteen years old. The trunk is cut open, and its valuable pith, which is the foundation of commercial sago, is removed.

The pith is mainly starch. It is treated with water, and the starchy substance is carried off into containers; there it settles and solidifies as a sort of dried meal. This is worked into a paste and forced through sieves into fine grains. These fall upon hot plates and form translucent globules, and they are the pearl sago of commerce. Sago is prepared for the table in much the same way as tapioca.

SAGUENAY, *sag eh na'*, RIVER, a river of the province of Quebec and one of the largest tributaries of the Saint Lawrence, has its source in a number of streams flowing into Lake Saint John, from which the Saguenay issues. The river has a length of 110 miles, flows in an easterly direction, and enters the Saint Lawrence 120 miles northeast of Quebec. There are numerous rapids and cascades in the first forty miles of its course, but from Chicoutimi it is navigable for small steamers, and from Ha Ha Bay, sixty miles above its mouth, for large steamers. In its lower course the Saguenay is from three-fourths of a mile to two miles wide, and from 800 to 2,000 feet deep. From Ha Ha Bay to the Saint Lawrence it flows through an unbroken chasm of rock with nearly vertical walls, which vary in height from 300 to 1,800 feet. The river is famous for the grandeur of its scenery. Tadusac, at its mouth, and Ha Ha Bay are summer resorts.

SAHARA, *sa hai'ra*, the largest desert on the earth's surface, occupying the greater part of Northern Africa. It extends, roughly, from the Atlantic Ocean, on the west, to the Nile basin, on the east, and from the Sudan, on the south to the Atlas Mountains and, in places, to the Mediterranean sea, on the north. The arid region east of the Nile is a part of the desert. The entire area of

the Sahara is more than 3,500,000 square miles—almost as extensive as the mainland of Europe and quite equal in extent to the Dominion of Canada.

Its Surface. The Sahara is not, as many suppose, a vast, flat expanse of burning sand. On the contrary, the surface presents considerable variety. As a whole, this desert is a table-land, in elevation from 1,300 to 1,600 feet above the sea. In limited areas it drops to 500 feet, and there are a few depressions below sea level. The great central plateau, from 1,000 to 2,500 feet high, extends in a northeast—southwest direction three-fourths of the desert's length. It is crossed by three mountain ranges, the Tibesti, the Air and the Ahaggar, which rise to heights ranging from 6,000 to 9,000 feet. In winter they are snow-capped. The western part of the desert is chiefly rock-strewn plains, and the northern and eastern parts, the latter known as the Libyan Desert, are a vast expanse of sandy waste. Here are vast areas of glistening sand which is swept into fantastic and sometimes beautiful shapes by frequent strong winds—great hollows like the craters of volcanoes, gigantic drifts from 300 to 400 feet high, that rise like petrified waves above the surrounding levels. On these trackless wastes of shifting sand there is no animal or vegetable life except in the few oases.

Caravan Routes. The oases occur wherever water from underground natural reservoirs comes to the surface in the form of a spring and gives rise to vegetation. Here date palms grow luxuriantly—for the soil of the desert is everywhere fertile and needs only water to make it productive. Where the supply of water is sufficient to support a settlement, villages have sprung up, wheat, millet and barley are cultivated, and vegetables and fruits are grown; cotton also is raised, this being the chief fiber for weaving. Except for the oases, travel across the desert would be impossible, and the trade between the Sudan and the Barbary States would be almost entirely cut off. As it is, there are numerous well-marked caravan routes across, leading from Timbuktu and other cities of the Niger and from settlements on Lake Chad, to the Mediterranean ports. The desert has one important natural resource—salt, vast deposits of which occur in the southern part.

Climate. The Sahara has two seasons—winter, four months long, and summer, eight months in duration. In the central mountains

there is considerable rainfall, but the water, instead of running off in rivers, flows a short distance and then sinks into the sand. The climate of the north varies somewhat from that of the south. In the hot season the temperature rises to 120 degrees. The temperature falls sometimes forty degrees after nightfall. On the plateau water sometimes freezes at night, even after a very hot day. The entire desert is much visited by storms, which because of the quantities of sand they lift into the atmosphere are very dangerous. Sometimes these storms are so severe they cause the suffocation of travelers and camels.

Life in the Desert. Wild animals are rare in the Sahara. About the oases and on the outskirts there are lions, panthers, wolves, foxes, hyenas and jackals. Lizards and venomous serpents are numerous, and in the interior are found the jerboas, or jumping mice. The desert is the natural home of the camel, and this is the chief domestic animal, although a few donkeys, horses, goats, sheep and cattle are raised.

The Sahara is inhabited by a mixed people. In the west are the Berbers, or desert Moors; in the central region are the Tuaregs, who yet occasionally prey upon caravans; in the east are negroes and Bedouins.

SAIGON, *sigohn'*, COCHIN-CHINA, the capital of the French colony of Cochin-China and one of the finest cities in Asia, is situated on the Saigon River, thirty-five miles from its mouth. It is connected with Mekong by canal and with Mytho by rail. The river is navigable at high tide, and the city has a navy yard, a dry dock and repair docks, besides extensive wharves. It consists of two parts, the commercial town and the native town. It is regularly built and has good modern buildings, surrounded by gardens, as well as pleasant promenades. The chief structures are the citadel, the government palace, the arsenal, the astronomical observatory and the buildings of a number of colleges. The city also maintains botanical and zoological gardens. The trade is large and is carried on with the Dutch East Indies, the Philippines and with numerous ports of Asia and Europe. It is also an important center of rice manufacture. Population, 1931, 123,298.

SAILBOAT AND SAILING. A small row boat can be converted into a sailboat by having a mast raised and a sail attached to it, but such a boat will not sail in a satis-

factory manner because it has no center board or keel to prevent it from drifting with the wind. To overcome this difficulty a board, called the *lee board*, is hung to the lee side of the boat, that is, the side away from the wind. This will, in a measure, take the place of a center board. The mast should be of pine or spruce, ten feet long and about three inches in diameter at the base and a little smaller at the top. To put or "step" the mast, cut a hole the diameter of the mast in the center of the forward seat, and directly beneath this nail a block in which the base of the mast may rest. The hole in the block need not be more than two inches in diameter. Cut the mast down to fit it. This support will be strong enough for the mast of a small boat. Attach a boom of the mast so that it will readily slide up and down. The boom should be about twelve feet long and much smaller and lighter than the mast. Unbleached cotton sheeting is the best and least expensive material for a sail. The sail may measure eleven feet at the bottom and should be nine feet high. It should be hemmed on all sides and fastened to the mast by rings, so it will readily slide up and down. It is raised and lowered by means of a cord passing over a pulley at the mast head. An oar can be used for a rudder.

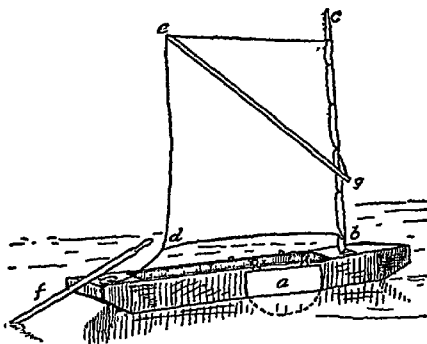


FIG 1
a, lee board, bc, mast, d, loop in sail, eg, sprit, f, oar used as a rudder

There is little difficulty in sailing a boat directly before the wind, but in most cases the navigator wants to sail in a direction different from that in which the wind is blowing, and he must learn to manage his sail and rudder, that he may sail his boat to the desired haven. A flat-bottomed boat or punt

(Fig. 1) is the safest for a beginner. (See page 482).

In Fig. 2 the wind is blowing in the direction of the arrow. The boat at A desires to sail to B. Obviously it cannot sail directly

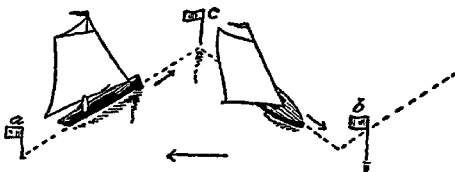
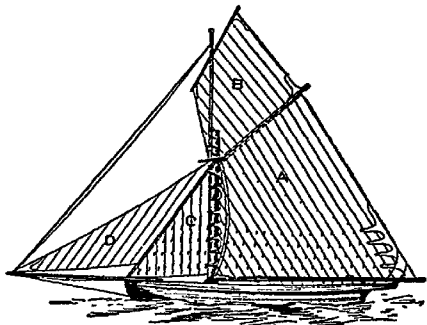


FIG. 2.

against the wind, and it must, therefore, take a zigzag course, or *tack*. When the sail is placed in the position seen at A, the boat is driven towards the stake C. When it reaches C the navigator turns into the wind and shifts the sail to the position shown at right, and is driven towards B, the point it is to reach.

Sails. Sails for larger boats are usually made of several breadths of canvas, sewed together with a double seam at the borders and edged all round with a cord or cords, called the *boltrope* or *boltropes*. A sail extended by a yard hung by the middle is called a *square sail*; a sail set upon a gaff, boom or stay, so as always to hang more or less in the direction of the vessel's length, is called a *fore-and-aft sail*. The upper part of every sail is the *head*; the lower part the *foot*; the sides are called *leeches*. The two lower corners of a square sail are called *clues* and are kept extended by ropes called *sheets*.



SAILS OF A CUTTER YACHT

Sails generally take their names, partly at least, from the mast, yard or stay upon which they are stretched; thus, the main course, or mainsail, the main topsail, the main topgallant sail, are, respectively, the sails on the

mainmast, the main topmast, and the main topgallant mast. In the accompanying diagram of the sails of a cutter yacht, A represents the mainsail; B, the gaff topsail; C, the foresail, and D, the jib.

SAINT AUGUSTINE, *aw'gus teen*, FLA., the county seat of Saint John County, on San Sebastian River and Matanzas Sound, thirty-six miles southeast of Jacksonville, and on the Florida East Coast Railroad. The town occupies a low site, only a few feet above the level of the sea, is an important winter resort and contains many large hotels. There are also numerous gardens containing subtropical plants, and oranges and other subtropical fruits are grown in the surrounding country. There are railroad shops and cigar factories. The remains of Fort San Marco, or Fort Marion, begun in 1566, are still in existence. There are also ruins of an old wall and city gate built by the Spaniards in the sixteenth century. Saint Augustine was settled by the Spaniards in 1565, and is the oldest town in the United States. The city manager form of government is in operation. The city has an airport. Population, 1930, 12,111.

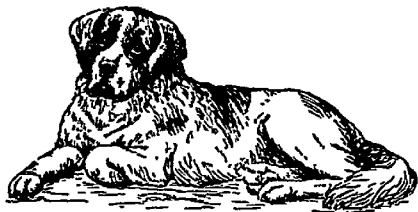
SAINT BARTHOLOMEW, *MASSACRE OF*. See BARTHOLOMEW'S DAY, SAINT.

SAINT BERNARD, *sah'n bur nahrd'*, GREAT, a celebrated Alpine pass in Switzerland, canton of Valais, on the mountain road leading from Martigny, in Switzerland, to Aosta, in Piedmont. The altitude is 8,150 feet at the highest point. Almost on the very crest of the pass is a famous hospice, next to Etna observatory the highest inhabited spot in Europe. The hospice was founded in 962 by Saint Bernard of Menthon. It is the mission of the resident monks, with the aid of Saint Bernard dogs, to rescue travelers who are lost in the snows on the mountains. The pass was much used by the Romans. In May, 1800, Napoleon led an army of 30,000 men, with artillery and cavalry, into Italy by this pass.

Little Saint Bernard, a mountain in Italy, belonging to the Graian Alps, about ten miles south of Mont Blanc. The pass across it, one of the easiest in the Alps, is supposed to be that which Hannibal used. It is 7,170 feet above the sea.

SAINT BERNARD, *bur'nahrd*, DOGS, a breed of large dogs named for the hospice of Saint Bernard in the Alps (see above), because the monks of this hospice train the

dogs to rescue travelers overcome by the snowstorms in the mountains. The dogs carry a bottle of brandy tied around their necks, and their sense of smell is so keen that



SAINT BERNARD DOG

they can detect a body buried several feet under the snow. When a traveler is found the dog calls for assistance by barking.

There are two varieties, the smooth-coated and the shaggy coated. The coat is usually white, with patches of black or brown. The standard breed has a tall, strong, erect figure, large head and intelligent expression. The Saint Bernard is the largest of domestic dogs; the best specimens are nearly three feet high and weigh 150 pounds.

SAINT BONIFACE, MAN., on the Red River, opposite Winnipeg, with which it is connected by four bridges. Three great systems, the Canadian National, Canadian Pacific, and Great Northern, and an electric railway serve the city. The surrounding country is an agricultural section and sends great quantities of wheat to the mills of Saint Boniface. Besides flour, meat and meat products, lumber, linseed oil and building materials are the important manufactures. The Union stockyards plant is valued at more than \$1,000,000, and the new Broadway bridge to Winnipeg was built at a cost of \$600,000. Saint Boniface is the seat of the Roman Catholic see of Manitoba. A Jesuit college, an academy for boys, two collegiate institutes, and a normal school are here. Population, 1931, 16,305.

SAINT CATHARINE'S, ONT., the county seat of Lincoln County, twelve miles northwest of Niagara Falls. Its transportation needs are supplied by the Canadian National Railway and several electric lines. It is the seat of Bishop Ridley College, and there are a collegiate institute, an armory, county buildings and a city hall. The town has about eighty industries, including machine shops, paper mills, flour and planing mills, electrical machinery, canning factories and

flax and silk mills. Electric power is developed in Niagara. Population, 1931, 24,753.

SAINT CHARLES, MO., the county seat of Saint Charles County, fifteen miles northwest of Saint Louis, on the Missouri River, twelve miles from its mouth and on the Missouri, Kansas & Texas and the Wabash railroads. There is an airport. The city contains a large car foundry, besides manufactories of Diesel engines, shoes, flour, brick, tile, furniture, steel-cutting dies, and other articles. There is also a considerable trade in limestone, tobacco, corn and other farm products. It is the seat of the Lindenwood Female College and Sacred Heart Academy. There is also a library, a hospital, a Memorial Hall, and a county building. The place was settled in 1769 and was incorporated in 1849. For a few years the town was the capital of the Northwest Territory and later of the territory and state of Missouri (1820-1826). Population, 1920, 8,503, in 1930, 10,491, a gain of 23 per cent.

SAINT CHRISTOPHER, *kris'toh fer*, or **SAINT KITTS**, a volcanic island of the Lesser Antilles, British West Indies, discovered by Columbus in 1493 and colonized by the English in 1623. It covers an area of sixty-eight square miles and together with the adjacent islands, Nevis and Anguilla, forms the Leeward Islands. It is traversed by mountains, of which the loftiest is the extinct volcano Mount Misery, 4,000 feet high. The capital is Basseterre, a seaport with an open roadstead. See TRAVELS IN DISTANT LANDS, subhead *Among the Lesser Antilles*.

SAINT CLAIR, ARTHUR (1734-1818), an American soldier, born and educated in Scotland. He reached America as an ensign in the French and Indian War, and took part in the expedition against Louisiana and Quebec. After this war he engaged in manufacturing in Pennsylvania, but at the outbreak of the Revolutionary War was made brigadier-general of the Pennsylvania militia. He organized the New Jersey troops that fought at Trenton and Princeton. In 1777 he was made major-general and given command of Fort Mifflin, but evacuated the fort on the approach of Burgoyne. For this act he was court-martialed, but acquitted. Later he fought with Greene in the South. He was elected to Congress, and in 1837 became president of that body. Saint Clair was the first governor of the Northwest Territory, and two years later became commander in

chief of the army of the United States. In 1789 he commanded the expedition against the Miami Indians, but his forces were disastrously defeated. He resigned his commission in 1792.

SAINT CLAIR, LAKE, one of the chain of the Great Lakes, but because of its small size not generally included as one of that group. It is joined to the great waterway on the north by Saint Clair River, which flows from Lake Huron, and on the south by the Detroit River, which connects with Lake Erie. The area of the lake is 396 square miles; the greatest length is thirty miles, the greatest breadth, twenty-four miles. A number of islands render the lake and river above it picturesque. See **GREAT LAKES**.

SAINT CLOUD, MINN., fourth city in size in the state, the county seat of Stearns County, sixty-five miles north of Minneapolis, on the Mississippi River. It is on the Northern Pacific and the Great Northern railroads, with shops of the latter, and has an airport and granite quarries. The city is in a grain-growing and stock-raising district. There is a valuable trade, and the rapids in the Mississippi furnish good water power. Division headquarters of great harvester works are here. Here is the state's largest teachers' college, St. John University and St. Benedict's Academy are nearby. Here also is a United States Veterans' Hospital. There are seven small parks, a Carnegie Library, a Federal building, a state reformatory, fine courthouse, and a home for the aged. The place was settled about 1852, and was incorporated in 1868. There is commission form of government. Population, 1930, 21,000.

SAINTE ANNE DE BEAUPRE, *bo pra'*, QUEBEC, a village of Montmorency County, situated at the junction of the Sainte Anne and Saint Lawrence rivers. For over two centuries Sainte Anne has been known as a Roman Catholic shrine, and many miraculous cures are said to be performed through the intercession of the saint. In the basilica are great piles of crutches cast aside by pilgrims. The permanent population is about 2,500, but on such feast days as that of Sainte Anne (July 26) over 25,000 have often been present. The church shown in picture was destroyed by fire in 1922, but was rebuilt.

SAINT ELYAS MOUNTAINS, a range of mountains located in the southeastern part of Alaska and the northwestern part of Canada, comprising a broad, elevated chain,

with numerous peaks and short ridges. Mount Logan, 19,500 feet high, is the highest peak. Mount Saint Elias is 18,026 feet high. Other prominent peaks to the southeast are Mount Fairweather, Mount Cook and Mount Vancouver. This range of mountains gives rise to numerous glaciers, the largest being the Malaspina.

SAINT ELMO'S FIRE, an electrical display in the form of a circle of light sometimes seen during thunderstorms about the tops of spires and trees, and the masts of ships. It is common in southern regions, and rarely may be seen on the manes of horses and about the human head. Sailors regard Saint Elmo's fire as a friendly omen, and among the ancient Greeks it gave rise to the myth of Castor and Pollux. See **CASTOR AND POLLUX**.

SAINT ETIENNE, *saN a te en'*, FRANCE, is situated in the department of Loire, on the Furens River, thirty-two miles southwest of Lyons. The town stands in the center of one of the most valuable mineral fields of France; and in addition to having extensive collieries, blast-furnaces and other iron works in the vicinity, it manufactures silks, cutlery and firearms, and is one of the largest centers in the world for the manufacture of ribbons, the yearly output of which exceeds \$12,000,000 in value. The collieries alone employ about 16,000 men. Population, 1930, 191,000.

SAINT GAUDENS, *gar'dens*, AUGUSTUS (1848-1907), the most distinguished of



SAINTE ANNE DE BEAUPRE

American sculptors, largely credited with the development of a distinctive plastic art in the United States. Born in Dublin, he was taken

to America when three months old. His early years were spent in the employ of a cameo cutter, but he later studied in New York, Paris and Rome. It was in the latter city that he executed his first statue, *Hawatha*. Among other notable productions are *Admiral Farragut*, in New York; *Abraham Lincoln*, in Chicago; and the statue of *Diana*, which was placed on the roof of the Agricultural Building at the World's Columbian Exposition, Chicago, 1893. The *Shaw Memorial*, on Boston Common, and the bronze equestrian statue of *Sherman*, in Central Park, New York, counted among the half dozen finest equestrian statues in the world, are the most celebrated of the sculptor's works. Saint Gaudens is equally famed for the rare charm of his low reliefs, the most notable being those of Bastien-Lepage and Robert Louis Stevenson.

SAINT GEORGE AND THE DRAGON, a legend of the patron saint of England, symbolizing the conquest of paganism by Christianity. According to the story, the country had been terrorized for years by a dragon which, after having exacted the sacrifice of all the sheep in the land, was demanding its daily toll of human lives. One day as Saint George was riding across a marsh he encountered a procession led by the king's daughter, clad in bridal attire, who was to be the next victim. Saint George promised the people deliverance, and charging upon the approaching dragon, injured it with his magic sword *Ascalon*. The dragon at once became weak and meekly followed the procession to the market place, where Saint George killed it with his sword. Saint George then told the people that it was God's power which had enabled him to conquer the demon, and he exhorted them to give up their idols and accept Christianity. The princess later married her brave knight rescuer. Edward III of England made Saint George the patron of the Knights of the Garter, and one of the insignia of that Order is a jeweled figure represented as slaying the dragon. A Russian Order of Saint George was founded by Catharine II in 1769. Raphael's painting of the slaughter of the dragon hangs in the Louvre, Paris.

SAINT-GERMAIN, TREATY OF, signed in September, 1919, was one of the most important in the history of modern Europe, for it dismembered the powerful empire and kingdom of Austria-Hungary, following its

defeat, with Germany, in the World War. The treaty was named for the town, near Paris, where it was signed.

Actually the dismemberment of the Dual Monarchy had preceded the treaty, for Austria and Hungary had already declared themselves republics, but the treaty sharply reduced their areas and delivered parts of the old monarchy to other powers, partly on the theory of the self-determination of peoples. The southern Tyrol, the Trentino, Trieste, and Istria, which had been Austrian, were given to Italy; Czechoslovakia was given Bohemia, Moravia, a part of Silesia, and a section of Austria; Bukovina was given to Rumania; Poland received Austrian Galicia; Jugo-Slavia got Bosnia and Herzegovina. The debts of the monarchy were apportioned among the benefited powers.

SAINT GOTTHARD, *saN' go tahr'*, a mountain group in Switzerland, belonging to the Lepontine, or Helvetic, Alps, which it connects with the Bernese Alps. Monte Leone, the highest peak, is 11,694 feet in altitude. Other high peaks are Waserhorn, 10,727 feet, and Bortelhorn, 10,481 feet.

Saint Gotthard Tunnel, a tunnel through the Saint Gotthard Pass, in the Alps, affords railway communication between Italy and Germany. It is 9½ miles long, 26 feet wide and 21½ feet high. The tunnel is lined with masonry throughout its entire length. The roof is a brick arch, and the sides are of rubble. The expense of construction was assumed jointly by the governments of Italy, Switzerland and Germany. At its highest point this tunnel is 3,786 feet above sea level and 3,150 feet below the surface of the mountain. The entrances are reached by spiral tunnels, through which the railway ascends.

SAINT HELENA, *hel' e-na*, a British island in the South Atlantic where Napoleon lived in exile from 1815 to his death, May 5, 1821 (see **NAPOLEON I**). It covers an area of forty-seven square miles and is situated 1,200 miles west of the nearest African coast. Many vessels make it a halting place, as it is in the direct line of ocean communication by way of the Cape of Good Hope. About one-fifth of the entire surface is available for cultivation, which is given over to farm and garden produce. The population, which approximates 3,550, consists of mixed Europeans and natives of Africa and of the East Indies. Jamestown is the port and only town of the island.

SAINT JOHN, N. B., the county town of Saint John County and largest city of the province, is situated on the southern shore of the province, on a peninsula overlooking the Saint John River and the Bay of Fundy, 245 miles by rail northwest of Halifax. It is on the Canadian National and Canadian Pacific railways. The city is regularly laid out and contains a number of good buildings. It ranks very high among the shipping centers of the world, and it has direct steamship connection with London, Liverpool, Glasgow, Bristol, Dublin, Belfast, Havre, Antwerp, South Africa, and the West Indies. Its annual trade amounts to more than seventy millions of dollars. The harbor is owned and managed by the city. It is free from ice throughout the year. The leading industries of the town include a sugar refinery, the manufacture of cotton and woolen goods, boots and shoes, machinery, tools, wooden ware, lumber, paper, soap and candles. The fisheries are also important, giving employment to several hundred men. Saint John was chartered in 1785. It was nearly destroyed by fire in 1877 but was rapidly rebuilt. Population in 1921, 47,166; 1931, 47,514.

SAINT JOHN OF JERUSALEM, KNIGHTS OF. See JOHN, KNIGHTS OF SAINT.

SAINT JOHN RIVER, often called the "Rhine of America," is the largest river in the province of New Brunswick. It was so named by Champlain and De Monts in honor of John the Baptist. It originates from two branches, one rising in the northern part of Maine and the other in the province of Quebec, and flows northeastward and then southeastward, entering the Bay of Fundy. Its length is about 500 miles, and for 225 miles it is navigable for small steamers during high water, while larger boats ascend the river as far as Fredericton. In the upper part of its course the Saint John forms a portion of the boundary between Maine and the provinces of Quebec and New Brunswick. The city of Saint John is situated at its mouth. At Saint John, just before the river enters the Bay of Fundy, are the noted Reversing Falls.

SAINT JOHN'S, NEWFOUNDLAND, the capital of the province, is situated on the northern point of the southeastern peninsula of the island, 550 miles northeast of Halifax, on the Newfoundland Railway. The city occupies a commanding site, which rises

abruptly from the harbor, which is landlocked and guarded by modern fortifications. Among the chief public buildings are the Roman Catholic cathedral, the Anglican cathedral, the house of parliament, the post-office and government house, Saint John's Athenaeum and Saint Bonaventure College. The inhabitants are chiefly engaged in fisheries and in the refining of seal oil. Other industrial establishments worthy of mention include foundries, machine shops, tanneries, soap factories, and manufactories of boots and shoes. It is an important station for the Atlantic whaling and sealing fleets. Population, 1911, 32,292; by the 1932 census, 43,176.

SAINT JOHNS, QUE., the county town of Saint Johns County, is situated on the Richelieu River, twenty-seven miles southeast of Montreal, and on the Canadian National, Central Vermont and the Canadian Pacific railways. The leading manufactures include furniture, sewer tile, sewing machines, silks, straw hats, and umbrellas. The city also has an important lumber and grain trade. Population, 1921, 7,734; in 1931, 11,256.

SAINT JOHN'S RIVER, a river in Florida about 350 miles in length, flowing northward almost parallel to the coast and emptying into the Atlantic sixteen miles east-northeast of Jacksonville.

SAINT JOSEPH, MO., the county seat of Buchanan County, and the third city of the state, smaller than Saint Louis and Kansas City. It is on the Missouri River, sixty miles northwest of Kansas City, and on the Atchison Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy, the Chicago Great Western, the Missouri Pacific, and Union Pacific railroads. There are an airport and two landing fields. There are more than 60 trucking companies. The town is connected by a steel bridge with Elwood, Kan., over 4,200 feet long. It is built along the bluffs, close to the river, on which it has a frontage of about three miles. Among the important buildings are a Carnegie Library (there are also other libraries), a courthouse, the Live Stock Exchange, a postoffice, a city hall, an auditorium, Y. M. C. A. and Y. W. C. A. buildings, large hotels, and many imposing business blocks. One of the state hospitals for the insane is located here, also the state fish hatchery. The educational institutions include a medical college, Sacred Heart Academy and a number of pri-

vate and parochial schools. The leading charitable institutions are the Memorial Home for Aged People, Saint Joseph's Hospital, Ensworth Hospital and Noyes Hospital. Among the educational institutions are a Junior College and three Catholic schools. There are three high schools.

Saint Joseph is the third industrial city of the state. The chief industries are connected with slaughtering and meat packing. Population, 1930, 80,935.

SAINT KITTS. See SAINT CHRISTOPHER

SAINT LAWRENCE, GULF OF, a large indentation of the Atlantic Ocean, separating Newfoundland from New Brunswick and Nova Scotia, and extending into the province of Quebec. Next to the Gulf of Mexico, it is the largest gulf on the Atlantic coast. It is partially enclosed by Newfoundland and Cape Breton Island, and it communicates with the Atlantic by three channels—the Strait of Belle Isle, separating Newfoundland from the mainland; the Strait of Canso, between Cape Breton and Nova Scotia, and Cabot Strait, sixty-three miles wide, forming the main outlet. Anticosti and Prince Edward Island are the largest islands in the gulf; besides these, there are the Magdalens and a number of other small groups. As the outlet of the Saint Lawrence River, this gulf forms the entrance to the chief waterway to the interior of Canada, and is of great commercial importance. It was discovered and named by Jacques Cartier in 1536.

SAINT LAWRENCE RIVER, one of the largest rivers of North America, which with its tributaries drains the basin of the Great Lakes and the southeastern part of Canada, an area of 500,000 square miles. The Saint Lawrence is generally supposed to rise in Lake Ontario, from which it flows in a broad channel, but its real source is the Saint Louis River in the northeastern part of Minnesota, which enters Lake Superior at Duluth. The Saint Mary's River joins Lake Superior and Lake Huron, the Saint Clair River, Lake Saint Clair and the Detroit River form the connection between Lake Huron and Lake Erie, and the Niagara River flows from Lake Erie to Lake Ontario.

The Saint Lawrence is one of the great rivers of the world, some authorities consider it second only to the Amazon in the volume of water it discharges. The main stream extends from Lake Ontario to the Gulf of Saint Lawrence, and is about 750 miles long. The

average width of its channel is one and one-fourth miles, but in a number of places there are broad expanses called *lakes*. The largest of these are Lake Saint Francis, thirty miles above Montreal, and Lake Saint Peter, between Montreal and Quebec.

Between Lake Ontario and Montreal there are a number of rapids caused by the outcropping of layers of rock in the bed of the River. The Long Sault, the Cascades, the Cedars and the Lachine, just above Montreal, are the most noted. Light river steamers going down stream pass through the rapids with safety, and the experience of "shooting the rapids" is very enjoyable to the passengers. A series of canals is used by boats going up stream. For about forty miles after leaving Lake Ontario the channel is studded with islands, forming the famous Thousand Island Park. On many of these islands there are beautiful summer residences, which add much to the beauty of the park. The chief tributaries from the north are the Ottawa, the Saint Maurice, the Montmorency and the Saguenay. Those from the south are the Richelieu and the Chaudière.

The Saint Lawrence is the only great waterway admitting ocean-going ships to the interior of the continent. See SAINT LAWRENCE WATERWAY, below.

SAINT LAWRENCE WATERWAY, a proposed uninterrupted deep-water channel for transportation through the Welland Canal and the Saint Lawrence River which would provide a water route from the head of Lake Superior to the Atlantic Ocean and thence to Europe for the largest ocean freight-carriers. Connected with the project is a vast hydro-electric enterprise. Because of its importance both to the United States and Canada, each would contribute to the engineering cost on a nearly equal basis.

The former country is interested primarily in an open route to Europe which would shorten transportation about 1,000 miles; naturally, eastern American seaports, threatened with some loss of traffic, are lukewarm toward the enterprise. Canada is largely interested in power; there has been conflict of authority on this point between the province of Quebec and the Dominion, but these differences have been compromised. International commissions have estimated the cost of the project to be about \$550,000,000 for dredging, for the power projects, and for all other engineering expenses. Of the total

estimated 5,000,000 horse power from the hydroelectric project, about 2,400,000 would be in the section available to the United States.



SAINT LOUIS, Mo., the largest city in the Mississippi Valley region of the United States, and seventh in population among cities of the country, according to the Federal census. In 1910 the population was 687,029; in 1920, 772,897; in 1930, 821,960.

General Description.

Saint Louis is situated on the west bank of the Mississippi River, twenty-one miles below the mouth of the Missouri, 283 miles southwest of Chicago, 599 miles south of Saint Paul and 709 miles north of New Orleans. On the opposite bank of the river is East Saint Louis, Ill., the third city in size in that state. The city proper extends along the river for a little over nineteen miles, and reaches westward for about seven miles. Its area is sixty-two square miles. The site is high and gently undulating land, which rises gradually from the Mississippi, the country to the west of it being a rolling plain of about 200 feet altitude.

The city is admirably laid out. The eastern boundary conforms to the great bend in the river, and the streets near this are parallel with the river bank; farther westward they gradually straighten and assume a north and south direction. Most of the streets crossing these extend east and west. Market Street divides the city into north and south sections for numbering, all of the streets that cross Market being called *north* on one side of it and *south* on the other side. The streets running north and south are numbered, beginning with the river and extending as far as Twenty-fifth Street. Those running east and west are named, and in numbering the buildings, each block begins a new hundred. Broadway is one of the chief downtown streets extending north and south, and it runs parallel with the river. Washington Avenue in the downtown section is the location for wholesale dry goods trade, and its western portion is given to fashionable residences. The

fashionable part of the city is at the west end, and Lindell Avenue is one of the principal streets passing through it.

Interesting landmarks include the old houses in which Eugene Field and Ulysses S. Grant once lived.

Parks. The public parks and squares embrace over 2,200 acres. The largest park is Forest Park in the west end, covering nearly 1,400 acres. It contains the museum of fine arts and the zoological gardens. Parts of it are heavily wooded with oak, but the western half was cleared to make room for the Louisiana Purchase Exposition. Carondelet Park, on the south side, has an area of 180 acres and is noted for its beautiful scenery. In the south-central part of the city is Tower Grove Park, still larger, containing beautiful lawns and shrubbery, and celebrated for its statues of Shakespeare, Humboldt and Columbus. Near this is Shaw's Garden, officially known as the Missouri State Botanical Garden. This park is famous for its botanical garden and its arboretum, which contains all kinds of trees and shrubbery that will grow in the climate. On the north side of the city are O'Fallon Park, of 160 acres, and Fairground Park, which contains a large swimming pool and numerous playgrounds. There are many smaller parks scattered about the city. Of these, Lafayette Park was formerly the most beautiful, but the tornado in 1896 destroyed nearly all of its fine trees. This park contains a fine statue of Thomas H. Benton. Forest, Tower Grove, O'Fallon and Carondelet parks are connected by fine boulevards.

Buildings. Saint Louis is well built, and its appearance gives an impression of strength and durability, rather than of ornament. Nearly all buildings are of brick or stone. The older part of the city, near the river, contains a few buildings of historic interest, in which traces of the old colonial style of architecture are still found. Among the public buildings is the Courthouse, on Broadway, in the form of a Greek cross, surmounted by a dome nearly 200 feet high. The interior of the dome is decorated with frescoes, illustrating events in the history of the city or country. The Federal building on Olive Street is a structure of granite, erected at a cost of \$8,000,000. It contains the customhouse, the Federal courts, and the downtown branch of the post office. The downtown Public Library covers the block between

Thirteen and Fourteenth and Olive and Locust. The City Hall, a structure of brick and stone, occupies an entire block. To the west are the Municipal Court buildings, the new \$6,000,000 Municipal Auditorium building, and at Market and Eighteenth streets is the Union Station, one of the largest and finest buildings of its kind in the world. The Coliseum has a seating capacity of 15,000. Another important public building is the \$4,000,000 Civil Courts building.

Other buildings of note are the Roman Catholic Cathedral, erected at a cost of \$3,000,000, the Protestant Episcopal Cathedral, the Second Presbyterian Church, the Pilgrim Congregational Church, the Union Methodist Church, the Shaare Emeth Synagogue and the Museum of Fine Arts.

Sportsman Park, the home of the St. Louis Cardinals and the Browns, is the leading baseball park. The Municipal Theater in Forest Park is one of the best known in the country. Among the leading downtown hotels are the Jefferson, the Statler, the Mayfair, the Mark Twain and the American. Larger hotels in the West End include the Coronado, the Chase, the Park Plaza, the Melbourne, Congress, Gatesworth and Branscomb.

Institutions. Washington University is one of the leading educational institutions. This occupies a beautiful site overlooking Forest Park. Nearby is St. Louis University, one of the oldest in the West. The city maintains a teachers' college in connection with its public schools, and there are numerous institutions of learning maintained by the various denominations. The libraries include the Public Library of over 550,000 volumes, occupying a building erected through the generosity of Andrew Carnegie, who gave the city \$1,000,000 for the purpose, and the Mercantile Library containing about 130,000 volumes and occupying its own building. The rooms of this library are also of interest because of their collections of paintings and statuary. The city maintains a dispensary, a hospital, an asylum for the insane and a reform school. The state school for the blind is also located here. Besides these institutions, there are numerous others of a charitable and philanthropic nature, maintained by various organizations.

Industries. Saint Louis is the distributing point for a large section of country to the south and southwest, including Texas and

Mexico. It is the terminus of more than a score of railways, and consequently has an important wholesale trade and is one of the largest centers of transshipment in the country. The Mississippi is crossed by the great Eads bridge, a structure of granite and steel, which provides a double railway track, sidewalks, auto roadway and street car tracks. The bridge leads into a tunnel for railroads, which passes for more than 4,000 feet under the business portion of the city (see EADS, JAMES B.). Three miles north of the Eads bridge is the Merchants' bridge, and between the two is the McKinley bridge. Still farther north are the Lewis and Clark bridges. The Municipal bridge spans the Mississippi River about a mile south of Eads bridge. St. Louis has an important river traffic, since the river is navigable to this point at all seasons of the year. It is one of the chief ports of the Mississippi Waterway System, which links it with St. Paul, New Orleans, and Chicago. The city has passenger and mail air lines reaching all important cities throughout its trade area, as well as to the important trade centers of the country. The St. Louis municipal airport, Lambert Field, is at Anglum, St. Louis county.

Saint Louis is one of the largest fur markets in the United States, having begun its career as a fur-trading post. It is also a great horse, mule and tobacco market, and a leading center in the middle west for the marketing of boots and shoes. Principal industries include slaughtering and meat packing, drug and chemical manufacturing, steel and iron works, shoe manufacturing, rolling mills, petroleum refining, auto manufacturing and shipping by water and rail. There are also immense plants engaged in the manufacture of woodenware, hardware, railway cars, clothing, furniture and hundreds of other commodities.

History. In 1763 the territory west of the Mississippi, with other American possessions, was ceded by France to Spain, but the latter did not take possession until 1770. The first settlement was made in 1764, and the village was named in honor of Louis XI of France. A year later it was made the capital of Upper Louisiana. It remained under Spanish control until 1800, when it was receded to France, and in 1803 it became a part of the United States by the purchase of Louisiana. Following this, settlers rapidly

crossed the Mississippi River, and Saint Louis began to increase in population.

From the start it was a center of trade and supplies, and as the country to the west and south continued to be settled, the town increased in importance. A large number of Germans early settled in the city, and their influence on its business and institutions has always been strong. During the Civil War Saint Louis contained Union and Confederate sympathizers, though the former were in the majority. After the close of that conflict the city continued to grow and prosper. Its business interests have always been conducted on a solid financial basis and after the most conservative methods. In 1904 it was the site of the Louisiana Purchase Exposition, the largest world's fair that had been held up to that time. An elaborate historic pageant, held in Forest Park in 1914, attracted thousands of visitors.

SAINT MARK'S, CATHEDRAL OF, a celebrated church in Venice and one of the world's most beautiful structures, faces the east side of the Square of Saint Mark's, or the Piazza. It is so named from the patron saint of the city, Mark, the apostle.

The first church on the site of the cathedral was begun in 830. This was destroyed and was rebuilt in 976. The second church was also destroyed, by fire, and in the eleventh and twelfth centuries it was reconstructed in Byzantine style. The additions made in the fifteenth century were Gothic. Until 1807 Saint Mark's ranked only as a church and was the chapel of the rulers of Venice, but since that date it has been the cathedral of the city.

The cathedral, which is about 250 feet in extent from east to west, and 170 feet from north to south, contains over 500 columns, each in richly ornamented Oriental style. In its present form it is a Greek cross, surmounted by a dome at the end of each arm and one in the center. The west front has five large porches, each so deep that the roof over them forms a spacious balcony. In front of the church are three bronze sockets, in which were formerly placed the flagstaffs which supported the banners of Venice.

The cathedral itself is a curious structure, combining several different styles of architecture. The roof is covered with small cupolas, like those of mosques, and the building contains a number of rows of arches, one above the other. The interior is finished al-

most entirely in mosaic, set in a golden groundwork. Over the central door is a mosaic of Christ, Mary and Saint Mark. In the three domes of the nave are representations of David, Solomon and the prophets; the ascension; the descent of the Holy Ghost, and the Holy Trinity. On the chancel screen are fourteen marble statues of Saint Mark, Mary and the twelve apostles. Another mosaic represents the genealogy of Mary. The church also contains many bronzes and other objects of interest, dating from the fourteenth and fifteenth centuries. See **VENICE**

SAINT MARY'S RIVER, a river connecting Lake Superior with Lake Huron. It is about forty miles long, and forms the boundary between Ontario and the northern peninsula of Michigan. Its course is southeast. The famous Sault Ste. Marie Rapids form the beginning of the river, which is about a mile wide as it leaves Lake Superior. Ship canals on the Canadian and American sides enable boats to pass around the rapids. At the upper end of the rapids the river is spanned by a bridge of the Canadian Pacific Railway. The river is broad, and contains many large islands. Its shallow places have been dredged for lake vessels, and it is one of the most important waterways of the world. See **SAULT STE. MARIE CANAL**.

SAINT MAURICE, *maur'is*, a river of the province of Quebec, rising in a chain of lakes and flowing southeasterly into the Saint Lawrence, at Three Rivers. It is about 350 miles long and its chief tributaries are the Rabbon and the Vermilion, from the west, and the Bastonnois and the Croche, from the east. Numerous cascades and a fall of 160 feet about twenty-two miles above its mouth add to the picturesqueness of its course.

SAINT-NAZAIRE, *sa'n'na-zair'*, FRANCE, one of the great seaports of the country, capital of an arrondissement (province) in the Loire region, at the mouth of the Loire River, forty miles west of Nantes. The fine harbor was enlarged during the World War, and became an important port for landing and embarkation of troops of the American expeditionary forces in that struggle. Its foreign trade is worth about \$8,000,000 a year; the chief shipments are woolen goods, wine, silk and fruit, brought by rail and river from the interior, and the products of iron foundries, flour and lumber mills of the city. Population, 40,000

SAINT PATRICK. See **PATRICK, SAINT**.



The New Cathedral

SAIN'T PAUL, MINNESOTA, one of the "Twin Cities of the Northwest", the capital of the state. In size it is thirty-first in the United States and second in the state. It is situated at the head of navigation on the Mississippi River, 410 miles northwest of Chicago. The distance from Saint Paul to New Orleans is 1,275 miles; to New York, it is 1,322 miles, and to Seattle, 1,823 miles. The railroads serving this city are the Chicago, Burlington & Quincy; the Chicago Great Western; the Chicago, Milwaukee, Saint Paul & Pacific; the Chicago, Rock Island & Pacific; the Chicago, Saint Paul, Minneapolis & Omaha; the Great Northern; the Minneapolis & Saint Louis; the Minneapolis, Saint Paul & Sault Ste. Marie; and the Northern Pacific. Holman Municipal Airport is one and a half miles southeast from the courthouse. The area of the city is about 56 square miles, it joins Minneapolis on the west.

Saint Paul proper is confined to the east bank of the river, really the north bank, since opposite the city the Mississippi flows in a slightly southeast direction. The portions across the river belong to the municipalities of West Saint Paul and South Saint Paul, though these are usually included when speaking of Saint Paul as a whole. The city occupies a beautiful site, on bluffs which rise from the river in a series of terraces. Lying on the lowest level next to the river are found the railway yards, the wharves, the union depot and most of the wholesale houses, the second level is devoted almost entirely to the retail trade, the hotels and some of the public buildings, while the highest level is occupied by residences. The city is admirably laid out, the streets being broad and nearly all of them well paved. In the residential sections they are ornamented by shade trees and lawns. Several bridges for automobiles and foot passengers and a number of railway bridges across the Mississippi.

Saint Paul has an extensive system of parks and parkways, including many recreation spots, with a total area of 2,250 acres, and 26 miles of parkways. Phalen Park, Saint Paul's largest park, comprises 487

acres in the city, and a large additional area to the north belonging to the county. A lake here covers 207 acres and has a fine bathing beach. In addition, there are numerous playgrounds, tennis courts, baseball diamonds, picnic grounds and a municipal golf course. Como Park comprises 457 acres and is second in size. Here are the botanical gardens of the city with one of the largest greenhouses in the West and a zoo. Mounds Park contains many Indian mounds. It comprises, including the State Fish Hatchery and the Municipal Forest, which adjoin, a total connected park area of some 180 acres. The parkway system connects the parks with each other and with the chief centers in the city. Adjoining the city on the north are the grounds of the Minnesota Agricultural Society.

An abundant supply of pure water, is drawn from spring-fed lakes and artesian wells. The lakes are under control of the city and their shores are patrolled and the waters protected from pollution.

Chief among the magnificent public buildings is the state capitol, occupying an eminence on the North Side. It is constructed of Georgia marble, with Minnesota granite for its foundation and steps; it is one of the finest buildings in the United States. Its large white dome, 220 feet high, is visible from all points of approach to the city. The interior is finished in marble and other costly varieties of stone, some of which were imported from central Africa. Among the decorations of the interior are mural paintings by John LaFarge, Kenyon Cox, Edwin Howland Blashfield and other famous artists, depicting both allegorical subjects and scenes from the state's history.

Saint Paul has five national banks and 14 state banks and trust companies. The magnificent Roman Catholic Cathedral, Saint Paul's (Episcopal), the First Methodist, the Christian Scientist, the House of Hope (Presbyterian), the People's Church, the Park Congregational and the First Baptist are the leading church edifices. Other public buildings of importance are a city hall and court house, an auditorium with large seating capacity, and a post office.

Among the educational institutions in the city are Hamline University, Macalester College, College of St Thomas, Saint Paul Seminary, Saint Paul College of Law and three Lutheran seminaries. The State Col-

lege of Agriculture and the experiment station are located but a short distance from the city limits. The city has a public library containing about 374,000 volumes and the Hill Reference Library containing 50,000 volumes. Both of these are open to the public without charge.

The Ford Motor Company purchased 167 acres of land in the city limits, adjacent to the Federal Dam on the Mississippi River, where have been constructed a ten million dollar manufacturing plant and hydro-electric station.

The city is also an important manufacturing center, and the value of its manufactured products annually exceeds \$330,000,000. Saint Paul has the largest law book publishers, the largest advertising specialty house and the largest plant for the exclusive manufacture of hoisting machinery, in the world. There is also one of the most important livestock markets in South Saint Paul.

The Indian name of Saint Paul was In-nijiska, which means "the white rock." The first white settlers were French traders who located an outpost here for trading with the Indians. It is supposed that this settlement dates from 1658. The present name dates from 1841, when Father Gaultier erected a log chapel at the corner of Third and Minnesota streets and named it Saint Paul's Chapel. From the time the land in the Northwest was thrown open to settlement the city continued to grow. The commission form of government was adopted in 1909.

Saint Paul is a city of homes, and its residence areas are beautified by shade trees and diversified by hills and valleys. From the beginning the city has been remarkably free from disaster by fire, flood or disease, and it has had a steady, conservative growth, commensurate with the growth of the Northwest.

Population, 1920, 234,698; in 1930, 271,606.

SAINT PAUL DE LOANDA, *loahn'dah*, ANGOLA, also called LOANDA, is the chief city and the capital of the Portuguese colony of Angola, in West Africa. It has a large harbor, the entrance of which is obstructed by sandbars. The city was formerly the center of the slave trade between Africa and Brazil, and is a very old settlement. In the seventeenth century it was famous for its fine churches and monasteries. Among the exports are ivory, coffee, rubber, hides and palm oil. A railway connects it with Am-

baca. Population, 1930, estimated, 25,500, 1,800 of whom are Europeans.

SAINT PAUL'S CATHEDRAL, in London, begun by the famous architect, Sir Christopher Wren, in 1675, and completed by him in 1710, is one of the finest domed buildings of Europe and the most imposing modern structure in England. It has the usual proportions of the English Gothic church, but is Renaissance in style, the dome being its prominent feature. The lantern terminating the dome is 360 feet above the pavement. Next to the dome, the best portion is the west front, with its portico and bell turrets.

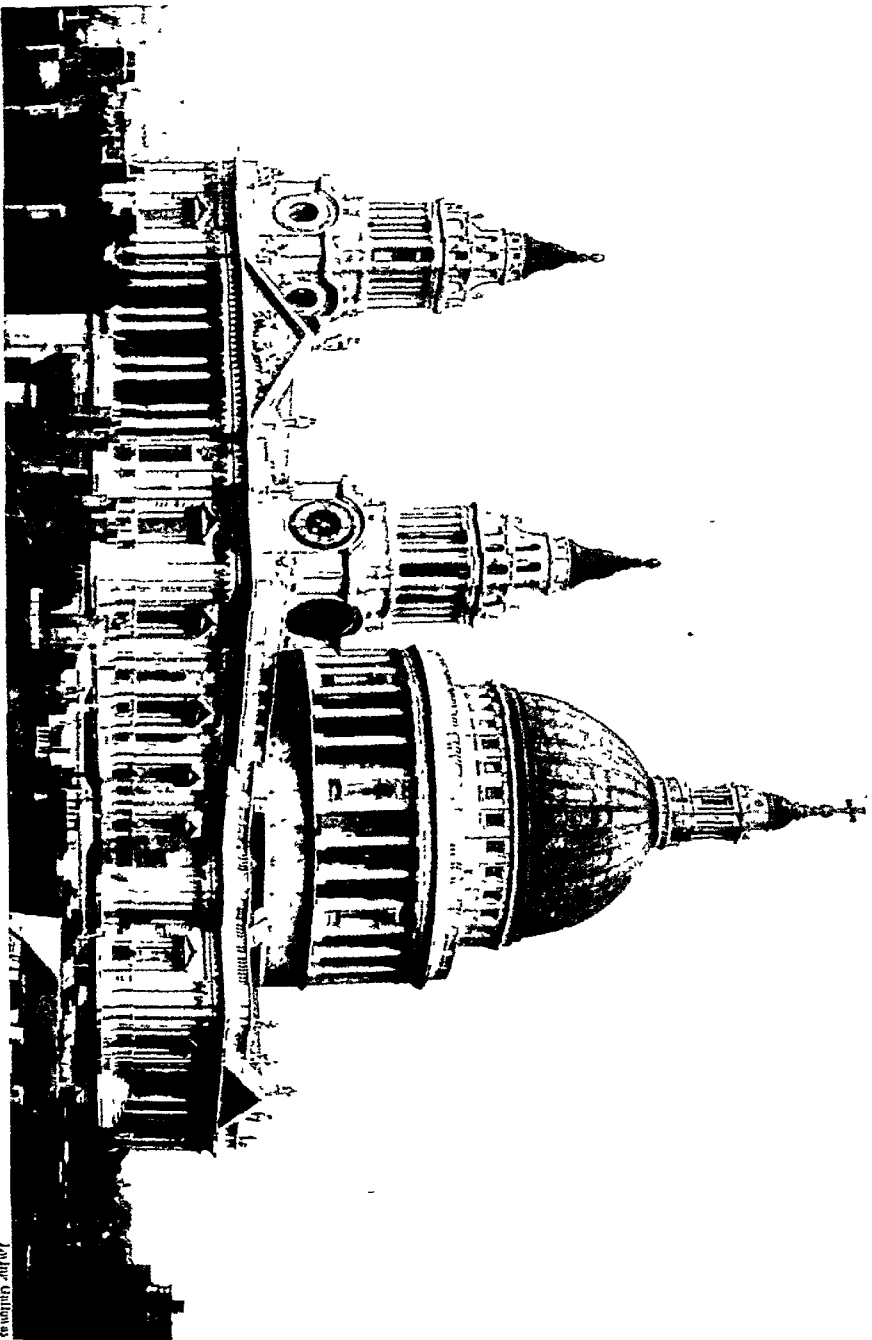
Saint Paul's is the most illustrious of Protestant churches. The site of the present building was occupied about 610 by a Christian church, which was destroyed by fire in 1087. This was succeeded by a more splendid building, now known as "Old Saint Paul's." This, also, was burned, in the great fire of London, in 1666. The plan made by Wren for the present structure was materially modified by a decree of the clergy, which resulted in some awkward architectural compromises in the detail of the structure.

The renowned architect and his associates were on the point of framing plans for repairing and remodeling "Old Saint Paul's" at the very time of its destruction by fire. Royalty and clergy, architect and artisans, all took part in the vast undertaking necessitated by the construction of an entirely new building. Although in essentials the new cathedral is the work of one mind, numerous elements were introduced by his advisers. Freeman has said that in this structure we have a Gothic conception expressed in Italian ideals. These ideals moreover were warmed by the steady glow of the British spirit.

Within, the view down the long nave into the choir is the principal interior scene. Above appears the second inner dome that relieves the long distance to the outer dome.

Among notable persons buried in the crypt at Saint Paul's are its architect, Sir Christopher Wren, Nelson, Wellington, Collingwood, Moore, Howe, Roberts, Barry, West, Reynolds, Lord Salisbury, and Beatty.

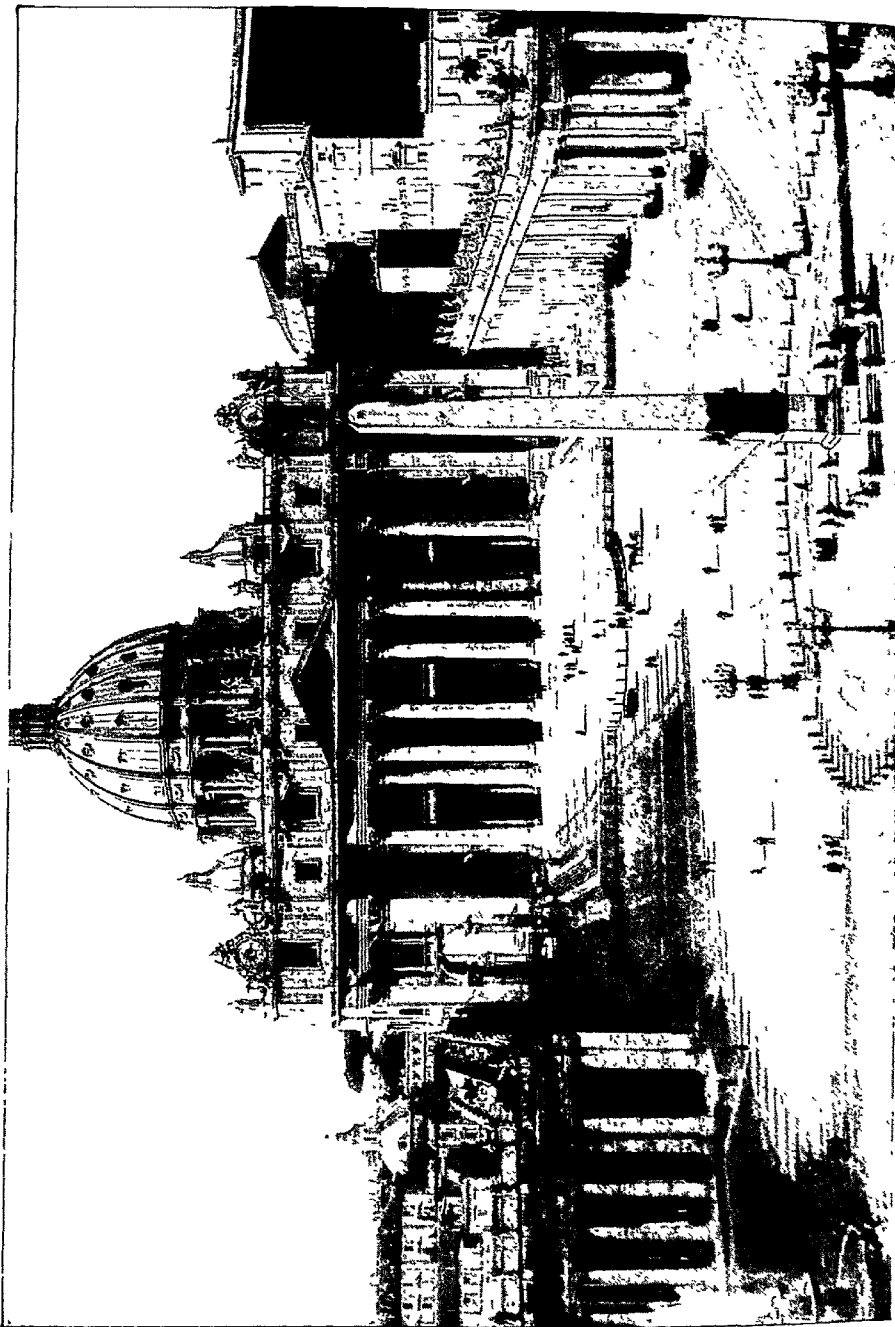
SAINT PETERSBURG, FLA., in Pinellas County, 25 miles south of Tampa, on a peninsula which separates Tampa Bay from the Gulf of Mexico. It is on the Atlantic Coast Line and the Seaboard Air Line railways; it is served by two important bus



Living Editions

HISTORIC SAINT PAUL'S CATHEDRAL

There has been a church on this spot in London for more than thirteen hundred years. The building now there dates from about 1675. It was destroyed by the famous Christopher Wren.



THE MOST IMPORTANT CHURCH IN THE WORLD

Saint Peter's Church, in Rome, adjoins the buildings of the Vatican. It occupies the site of a basilica created by Constantine in 306. The present building was completed in 1624 and dedicated in 1626

KeyStone

lines and two airports and one landing field. The town possesses more than 100 hotels because it is one of Florida's most important winter resorts. The climate is subtropical with scarcely more than six days in a year without sunshine. There are a Carnegie Library, a hospital and a junior college. It is governed according to the commission plan. Population, 1920, 14,237; in 1930, 40,425, a gain of 184 per cent.

SAINT PETERSBURG, RUSSIA, the former name of the capital of the country, changed to Petrograd in 1914 after Russia entered the war against Germany and Austria-Hungary. In 1924, on the death of Lenin, the name was again changed, and the city became Leningrad. See **PETROGRAD**.

SAINT PETER'S CHURCH, the largest and one of the most magnificent churches in Christendom, located at Rome. It is a cruciform building, in the Italian style, surmounted by a lofty dome, built on the site where Saint Peter is said to have been buried and where many Christians suffered martyrdom under the pagan emperors.

In 306 Constantine the Great erected on this spot a basilica of great magnificence. During the residence of the Popes at Avignon (1309-1376), it threatened to fall into ruins, and Nicholas V commenced work upon its reconstruction. Advance was slow until Julius II (1503-1513) decided on the erection of an entirely new building and laid the foundation stone of the new cathedral in 1506. The famous Bramante was its first architect. After his death various architects had charge of the work until the appointment, in 1546, of Michelangelo, who nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII in 1626.

The extensive colonnade, which surrounds the piazza and forms a magnificent approach to the church, is supported by 264 columns, 48 feet high, in four rows. The piazza is oval in form and is adorned with an obelisk over 80 feet high, of red granite brought from Egypt in the reign of Caligula, and by two magnificent fountains, the finest in Rome. The height of the dome from the floor is 435 feet, and the exterior diameter is 195 feet.

The length of the cathedral within the walls is 613 feet, the width 87 feet. The magnificent canopy over the lofty altar is 95

feet high. Near this canopy is the famous bronze statue of Saint Peter represented as seated in a chair, with right foot extended. The floor of the cathedral covers nearly five acres, and the cost is estimated to have exceeded \$50,000,000. The interior is elaborately decorated with many-colored marble columns, a few costly paintings, numerous fine mosaics, marble statuary and monuments.

SAINT PIERRE, JACQUES HENRY BERNARDIN DE (1737-1814), a distinguished French critic and novelist, remembered all over the world for his sublime story of *Paul and Virginia*, which has been translated into more than thirty languages. His first book, *A Voyage to the Isle of France*, admired by scholars for its literary style and by churchmen for its reverent attitudes, brought the author a small yearly pension. He next published *Studies of Nature*, and added a supplement containing *Paul and Virginia*, the story of a boy and a girl portrayed with such lofty sentiment and depth of feeling that its style became a pattern for French literature.

SAINT PIERRE AND MIQUELON, two small islands ten miles from the southern shore of Newfoundland, which are the only remaining possessions of France in North America, held since 1635. The combined population of the group is 3,600; the area, 93 square miles. The people live by cod-fishing, and are joined during the season by hundreds of fishermen from France. During the prohibition era in the United States these islands were a concentration point for liquor smuggling to American coast cities.

SAINT QUENTIN, *kahN taN'*, FRANCE, situated on the River Somme, ninety-five miles northeast of Paris. It was formerly an important frontier post between France and the Low Countries. The buildings of note before 1914 were the church, dating from the twelfth century, the hotel de ville, the palace of justice and the museum. The industries included the manufacture of cotton and woolen goods. The city is noted for important battles, in 1557, in which the French were defeated by the Spaniards under Philip II, and January, 1871, in which the town was captured by the Germans. Its imperishable fame came in the World War, from 1914 to 1918. The Germans captured it in the early days of the war and held it until the summer of 1918. Bombardments reduced it to partial ruins, but the great church was restored in 1921. Population, about 37,000.

SAINT-SAENS, *saN sahNs'*, CHARLES CAMILLE (1835-1920), a distinguished French composer and pianist. He studied in Paris at the conservatory and won several prizes for his compositions. Later he held several important positions as organist in Paris churches, but abandoned this to devote himself to composition and concert. Although he composed several operas, of which *Samson and Delilah* is best known and retains its popularity, his fame rests upon his instrumental music and orchestration.

SAINT SOPHIA, *so fe'ah*, the largest Mohammedan mosque in the world, and the most famous structure in Istanbul (Constantinople), was built for a Christian church by the Roman Emperor Justinian the Great, and was completed in 538. In 1925, to conform to its Mohammedan character, the name was changed to Mosque Mehmedie. The building is rectangular, and its exterior is unattractive, but the beautiful interior makes it one of the architectural wonders of the world. The structure is 250 feet from east to west and 235 feet from north to south. The interior is divided by piers and columns into naves and aisles, and the great hall of worship is surmounted by a dome 180 feet high and 107 feet in diameter, and supported on four arches, each having a span of about 100 feet. This dome is the most impressive feature of the structure. In the base of the dome are the windows by which the edifice is lighted. A half dome extends east and west from the cornice of the dome, so the great hall of worship is covered with a dome-shaped roof.

The walls are finished with marble of different colors, arranged in beautiful designs, and the vaulting is set in beautiful mosaic. When the church was converted into a Mohammedan mosque all Christian emblems were covered or torn from the walls.

SAINT THOMAS, one of the Virgin Islands of the United States, which were purchased from Denmark in 1917, when they were known as the Danish West Indies. Saint Thomas is one of the three principal islands of the group, the others being Saint Croix and Saint John. It has an area of thirty-two square miles and a population of about 9,850. The natives are blacks. Saint Thomas (formerly Charlotte Amalie), the capital and chief town, lies on the best harbor in the Virgin Islands. (For a description of the town, see TRAVELS IN DISTANT LANDS, subhead *Among the Lesser Antilles*.)

The harbor is situated about midway on the southern side of the island, 1,442 miles from New York City. It is an important coaling station for vessels.

SAINT VINCENT, *vin'sent*, one of the islands in the British West Indian colony known as Windward Islands. Its area is 150 square miles, of which one-fourth is under cultivation, and the population in 1917 was 49,422. The island is of volcanic origin and has suffered much from the eruptions of Mount Soufrière, which is about 3,000 feet high. The capital is Kingstown, on the bay of the same name, near its southwest extremity. Saint Vincent is especially noted for the excellence of its arrowroot and sea island cotton.

SAINT VITUS'S DANCE, or **CHOREA**, *ko re'ah*, a nervous disease due to the presence of an infectious germ in the brain and spinal cord. It most frequently attacks children, especially girls, between the ages of five and fifteen. It is characterized by twitchings in the muscles of the face, and jerky movements of the arms, legs, hands, feet, back and abdomen. It is usually caused by overwork, worry, lack of nutrition or excessive nervousness, but may be associated with rheumatism or diseased tonsils. The patient is unable to control the movements, which may persist for several weeks or months, though they usually stop during sleep. The disease is seldom fatal.

Treatment consists of rest from all violent physical and mental exercise, cold spongings, nourishing food, and sometimes the administration of iron and arsenic. The person affected should be placed under the care of a physician.

Saint Vitus's dance takes its name from the fact that in Europe in the sixteenth century those afflicted with the disease sought relief at the shrines of various saints, the chief of which was the Shrine of Saint Vitus.

SAKHALIN, *sa ka tyeen'*, an island off the eastern coast of Siberia, the southern portion, being owned by Japan, the northern half by Russia. It is 600 miles long and from sixteen to 100 miles wide. It is separated from Asia by Sakhalin Gulf and by the Gulf and Strait of Tartary, and from Japan by the Strait of La Pérouse. A mountainous ridge extends throughout the entire length of the island, and the few streams, the largest of which is the Parany, are short and rapid and abundantly stocked with fish. The soil is

not highly productive, but the dense pine forests are an important resource. Coal and petroleum exist in large quantities, and the fur-bearing animals are numerous. The principal towns are Dui, Korsakova, Rykovskoie, Muravievski and Harukimachi, the seat of government. Japan acquired the southern half of the island from Russia in 1905, and during the World War extended its control over the entire island, but by subsequent treaties relinquished its claims north of 50° parallel of latitude.

SALADIN (1137-1193), a celebrated sultan of Egypt and Syria, who in 1187 caused consternation throughout the Christian world by his capture of Jerusalem. This led to the Third Crusade (see **CRUSADES**), and the fall of Acre in 1191. Saladin's defeats at the hand of Richard I of England compelled him to conclude a truce, which was followed by the withdrawal of Richard. The following year Saladin died at Damascus. A fine delineation of his character is found in *The Tahnian*, by Sir Walter Scott.

SALAMANDER, a small lizardlike animal belonging to the same class as the frog and toad (see **AMPHIBIANS**). It has a long, slender body, a narrow, pointed tail, and



SPOTTED SALAMANDER

four straggling legs which give it the appearance of a tiny alligator. The salamander is found in Europe and North America, except in the extremely cold regions. It lives under stones or logs and in other moist places, and feeds on insects, worms and snails. The spotted salamander of Central and Southern Europe is best known. It is from six to eight inches long, and has a smooth skin with black and yellow markings. The skin is covered with glands which secrete a sticky substance believed by some to be poisonous. A species frequently found in the United States and Mexico has a black, velvety skin. Salamanders breed in the water. The young, called tadpoles, breathe by external gills, which they retain for a long time.

SALAMIS, a horseshoe-shaped island of Greece situated in the Gulf of Aegina, about ten miles east of Athens. It has a mountainous surface, but a fertile soil, well adapted to the cultivation of olives and grapes. The area is about thirty-six square miles. The celebrated naval Battle of Salamis was fought here in 480 B. C., in which the Persians under Xerxes were defeated by the Greeks. The chief town is Salamis, or Kuluri. In the World War construction of a new arsenal for the Greek navy was begun here.

SAL AMMONIAC, *am'mak*, the chloride of ammonium, now generally obtained as a by-product of gas works. The commercial article is in the form of fibrous white crystals. It is used as a remedy for stomach disorders and occasionally in cases of pneumonia. Crude sal ammoniac is used in charging electric batteries, in textile printing, in galvanizing iron and in soldering.

SALARY GRAB, the name popularly applied to an act of the United States Congress, passed in 1873, increasing the salaries of members of Congress, the President, Speaker of the House of Representatives and Associate Justices. The increase in salaries was to take effect from 1871. This back-pay legislation was the feature that gave the act its name, and also caused such a storm of indignation throughout the country that it was repealed in 1874. The increase in salaries was from \$5,000 to \$10,000, for Senators, from \$5,000 to \$7,500, for Representatives; from \$8,000 to \$10,000, for the Vice-President, Speaker and Associate Justices; and from \$25,000 to \$50,000, for the President. When the law was repealed all salaries except those of the president and the Associate Justices were reduced to their former amounts.

SALE, as usually recognized, is the transfer of goods or property from one person to another for a consideration, the consideration being defined as anything of value—money or money and goods—accepted as equal in worth to the thing transferred. If goods are exchanged for goods only, the transaction is described as *barter*. While legally a transfer of goods for goods is recognized as a sale, the typical sale involves the use of money, but the same rules of law apply to both cases. There are differences of procedure between the transfer of personal property and the transfer of real estate. In

the former instance, the transaction is completed, when required, by a *bill of sale* from seller to buyer, which lists the goods at issue, names the consideration, and declares transfer of ownership. A sale of real estate is attested by a deed, and if full payment is not made, by a mortgage for the unpaid balance (see *DEED*; *MORTGAGE*). Sometimes in a sale, the thing bought is not at once delivered; for example, it is legal for a person to sell for future delivery a growing crop.

SALEM, MASS., the county seat of Essex County, sixteen miles northeast of Boston, on Massachusetts Bay, and on the Boston & Maine Railroad, the terminus of six branches. The place was first settled by Roger Conant and his associates in 1626 and is, next to Plymouth, the oldest town in Massachusetts. About 1692 the witchcraft delusion appeared in this district (see *WITCHCRAFT*). The town was intimately associated with many events of colonial history and contains a number of quaint old houses and irregular streets. It was the birthplace and early home of Nathaniel Hawthorne and the scene of some of the labors of Roger Williams. For many years after the Revolution, Salem was an important commercial center, and its merchants had almost a monopoly of the East Indian and China trade. The harbor, however, was not of sufficient depth, and business began to decline and the foreign trade to be transferred to Boston and New York, about the time of the War of 1812. There is still a considerable coastwise trade.

The industrial establishments are about 180 in number and include large cotton mills, tanneries, shoe factories, lead works, chemical works and other enterprises. Some of the prominent buildings are the Peabody Academy of Sciences, containing large ethnological and natural history collections; the Essex Institute, with its valuable library and historical relics; Salem Athenaeum, a public library; a city hall, a courthouse and a Masonic Temple. There are also several charitable homes for orphans and for the aged of both sexes. The city contains a state normal school, two private secondary schools, and two hospitals. On June 25, 1914, nearly a third of the city was destroyed by fire. Only a few lives were lost, but over 18,000 people were rendered homeless and the money loss was about \$10,000,000. Fortunately, the "House of Seven Gables," the Essex Institute and other historic buildings were un-

damaged. Population, 1920, 42,529; in 1930, 43,353.

SALEM, ORE., the capital of the state and its second city in size, and the county seat of Marion County, about forty-five miles south of Portland, on the Willamette River and on the Southern Pacific Railroad. It is also connected with Portland by an electric railway. The city is located on ground rising from the river; the streets are wide and beautifully shaded. Prominent buildings are the state capital (see *OREGON*), a city hall, a courthouse and a Federal building. State institutions are a penitentiary, reform school, school for the blind, school for deaf mutes, institution for the feeble-minded, asylum for the insane and the Government Indian Training School. The city has a business college, a normal school, a Carnegie Library and two public hospitals, Willamette University and a Methodist school. The surrounding country produces fruit, hops and wheat, and the city has manufactures of woollens, flour, loganberry juice, foundry and lumber products, machinery and other articles. Salem was laid out in 1844. Population, 1920, 17,679; in 1930, 26,266.

SALEYER, sa l'ur, **ISLANDS**, thirty small islands in the Indian Ocean, south of the Celebes, belonging to Holland. The 80,000 people are Malays.

SALIC LAW one of the laws of the Salian Franks which excluded women from inheriting certain lands, probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used. The application of this law to the claim of Edward III of England to the throne of France on the ground that he inherited it from his mother Isabella, daughter of Philip IV, of France, caused his claim to be rejected. See **EDWARD III**.

SALICYLIC, sal i sil'ik, **ACID**, an acid formed by the union of carbon, hydrogen and oxygen in certain proportions, and occurring in the buds of meadowsweet (*spirea*), wintergreen and birch, and in some chemical substances. When pure it occurs in fine, white, needlelike crystals. It has a sweetish acid taste. Salicylic acid is a powerful antiseptic, and it is extensively used as a preservative. Before its use in the United States

was forbidden by the government (1904) it was employed by packing houses for preserving meat. It is used in the arts in the manufacture of yellow, orange and purple dyes, for strengthening glue, and for preserving hides. Some of its compounds have a limited use in medicine.

SALINA, *sa le'nah*, KAN., the county seat of Saline County, 100 miles west of Topeka, on the Smoky Hill River and on Union Pacific, the Santa Fé, the Missouri Pacific and the Chicago, Rock Island & Pacific railroads. There is a local airport. The city contains large grain elevators, flour mills, a brick plant, ice works, a foundry and other establishments. There are 185 acres in parks. The Kansas Wesleyan University is located here, and the city also has a military academy, a normal school, a business college, and a Roman Catholic academy for girls. There are a Carnegie Library, a Masonic Temple, a city hall and a courthouse. Salina was settled about 1860, and was chartered as a city in 1870. Population, 1920, 15,085; in 1930, 20,155, a gain of 33.7 per cent.

SALISBURY, *sawlz'bere*, N. C., the county seat of Rowan County, on the Southern Railroad, 118 miles west of Raleigh. The city is in a farming and fruit-growing region, and contains railroad shops, cotton mills, hosiery works, concrete roofing factories, veneering works, knitting mills and woodenware. An airport is three miles from the city. Here are Catawba College, Livingstone College (for negroes), a public library, and an armory. A national cemetery contains the graves of more than 12,000 unknown dead. The place was settled by English churchmen from Salisbury, England, and was chartered in 1770. Population, 1920, 13,884; in 1930, 16,951.

SALISBURY, ROBERT ARTHUR TALBOT GASCOYNE-CECIL, Third Marquis of (1830-1903), an eminent English statesman, was educated at Eton, and at Christ Church, Oxford. He entered Parliament at the age of twenty-three and devoted the remainder of his life to public service. He advanced gradually until in 1866, on the formation of Lord Derby's third administration, he was appointed Secretary of State for India. The following year he resigned that office, but resumed it in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the

end of that war, having become Foreign Minister, he insisted that the treaty which Russia had forced from Turkey be submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman he became the recognized leader of the Conservative party. He became Premier, as well as foreign secretary, on the fall of the Gladstone government in 1885. With the exception of the years 1892 and 1895 Salisbury was at the head of the government from 1886 to 1902. He was regarded as one of the foremost statesmen and diplomats of his time.

SALISHAN STOCK, a group of Indian tribes, classed by language, but whose units possess various dialects. They once occupied prominently nearly all of Vancouver Island, and parts of British Columbia, Northwestern Montana and Northern Idaho. There were about eighty tribes. They number at present about 16,000.

SALIVA, the transparent watery fluid secreted by glands connected with the mouth. It keeps the mouth moist, and by mixing with the food during mastication makes of it a soft, pulpy mass, that is easily swallowed. It also changes the starchy elements into some kind of sugar. The salivary glands are the *parotid*, on the sides of the throat; the *sub-mamillary*, under the lower jaw; the *sub-lingual*, under the tongue, and numerous smaller ones, with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate and root of the tongue. Thorough chewing of the food stimulates the secretion of saliva and helps in the process of digestion (which see).

SALLUST, *sa'l'ust*, (86-34 B. C.), otherwise CAIUS SALLUSTIUS CRISPUS, was a Roman historian. He became tribune in 52 B. C., and in the civil war was a partisan of Caesar. In 47 B. C. he was made praetor elect, and in the following year accompanied Caesar to the African war, at the conclusion of which he was appointed governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, but was never brought to trial. In the luxurious retirement of his later years he wrote the *Bellum Catilinarium*, a history of the Catiline conspiracy, and the *Jugurtha*, or *Bellum Jugurthinum*, a history of the war against Jugurtha, king of Numidia, which are valuable rather for literary excellence than historical accuracy.



Leaping a falls

SALMON, *sam'un*, a fish inhabiting salt and fresh waters, and belonging to the same family as the trout and the whitefish. There are about one hundred species, but only five or six are generally known. Salmon inhabit cool water, and are found only in a cool temperate climate. They occur in the largest numbers off the Pacific coast of the United States, British Columbia and Alaska, and in the rivers of these regions. In the northeastern part of the United States, the eastern prov-

inces of Canada and in Norway and Sweden salmon are found which spend their lives in fresh water. These are known as *land-locked* salmon.

Description. The species best known are the quinnat, or king salmon, the blueback, the humpback and the dog salmon. While these species vary in minor points, they all have the same general characteristics. The typical color of the adult fish is a steel blue on the back and head which becomes lighter on the sides and under parts. The king salmon has an average weight of twenty-two pounds, but occasionally one is found weighing 100 pounds. The blueback is of a brighter blue than the king, but not so large, its average weight being about five pounds and its maximum twelve pounds. It may grow to three feet in length, but eighteen or twenty inches is the average size. The flesh of all salmon is of a reddish color, varying from pink to a deep orange. The color varies in the same fish at different times in its life, and the color is no guide to the quality of the flesh, as many suppose.

When it has reached its fifth year, the salmon is mature, and is capable of spawning. Salmon live in the sea until they are ready to spawn, when they ascend rivers to deposit their eggs in fresh water. Sometimes they ascend streams for hundreds of miles, and the strength and skill displayed by them in overcoming obstacles have won the admiration of all observers. Fish have been known to leap fourteen feet into the air and make a curve of twenty feet in

ascending a waterfall. If one fails the first time it continues to repeat the effort until it succeeds or becomes exhausted. Those that fail die in a few days.

The male digs a nest from one to four feet deep in the bed of the stream, and in this the female deposits a countless number of eggs. The spawning over, both male and female float down stream, tail first, making no effort to swim, and die within ten days. The young hatch in about five months.

When the young appear they are about an inch long and have a yolk sac attached to the under side. This furnishes all the nourishment for the young fish for the first two months. The young salmon live in fresh water for the first two years. When they move to the sea they are from three to four inches in length and weigh but a few ounces. After reaching salt water they grow rapidly.

Fisheries. The salmon is one of the most valuable food fishes in the world, and the salmon fisheries are exceeded in value only by those of the herring and the oyster. The greatest salmon-fishing centers in the world are on the Pacific coast of the United States and in Alaska and British Columbia. The fish are taken when they ascend the rivers, or usually in the spring. Gill nets, seines, traps or pound nets and fish wheels are employed in catching the fish. The fish trap consists of a series of nets so laid and fastened to stakes driven in the bottom of the stream as to form a winding passage leading to an inclosure from which the fish cannot escape when they have once entered it. Fish wheels resemble the revolving swing, with wire dip nets in place of the seats. The wheel is mounted on a horizontal axis and is so placed that the current keeps it in constant rotation. The nets pick up any fish that comes within their reach, and dump them into a chute down which they slide to a receiving bin. These wheels range from nine to thirty feet in diameter and from five to fifteen feet in width, and cost from \$1,500 to \$8,000. They are used extensively on the Columbia River. Some of them are attached to scows so they can be moved from place to place. In most of the Alaskan fisheries the trap or pound net is employed.

The fish are cleaned, dressed, cut into pieces and placed in cans, where they are thoroughly cooked by steam before the cans are sealed. In the small fisheries this work is done by hand labor, but in the large estab-

lishments it is all done by machinery. The quinnat, or king salmon, having an average weight of twenty-two pounds, is the species most extensively taken in Alaskan waters, Puget Sound and the Columbia. The blueback is also extensively taken in the same waters. The value of the salmon catch in Alaska every year is three to five times the purchase price of the territory.

SALOL, *sal'ole*, a compound of phenol and salicylic acid. It is a white powder, odorless and almost tasteless, and soluble in alcohol or ether, but not in water. It is used as a remedy for cholera and jaundice, and a component part of phenacetin, which is employed to relieve the pain of neuralgia and rheumatism.

SALOME, *sa'lo'me*, the daughter of Herodias, who caused the death of John the Baptist. The name also is borne by the mother of the apostles James and John and one of Christ's most devout female adherents, who followed him from Galilee in order to minister to him.

SALON, *sa'lon*, THE PARIS, an exhibition of works of living artists held annually in May and June at the two Palaces of the Fine Arts, when the coveted prize of Rome is awarded. Artists from all over the world may send their productions to the jury of experts, which decides on the works to be exhibited as well as upon the prizes and medals to be given. The National Society of Fine Arts, an independent organization, known as the New Salon, holds its annual exhibitions from May to July.

SALONIKI, *sah'lo ne'he*, GREECE, an important seaport, formerly in European Turkey, situated at the head of the Gulf of Saloniki, 315 miles nearly west of Constantinople and 250 miles north of Athens. As a result of the Balkan War Saloniki was incorporated into Greece. The city rises from the sea in the form of an amphitheater, and when seen at a distance presents an unusually striking appearance. It contains numerous ruins of ancient and medieval times, among which is a triumphal arch to Constantine. There are also a number of mosques of some interest, that of Saint Sophia being noted for its fine mosaics. The city was occupied by the allies October 6, 1915, and became an important post in the Balkan campaign (see WORLD WAR). In 1917 the city suffered from a disastrous fire. Population, 1928, 236,524.

SAL/SIFY. See OYSTER PLANT.

SALT. From the earliest ages salt has been used as a seasoner and preserver of foods, and has borne an important part in the lives of nations. Salt has always been regarded as a symbol of purity and stability. The Israelites were commanded to season their meat offerings to Jehovah with salt, and Jesus called his followers "the salt of the earth." Among certain tribes in the interior of Africa where salt is scarce it is used for money.

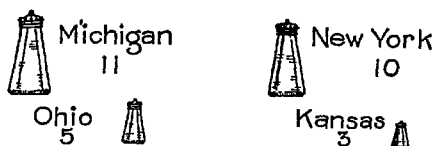
The "covenant of salt" could not be broken (*Num.* XVIII, 19). Among Orientals salt is regarded as a symbol of friendship and hospitality. The Arabs have several phrases signifying this meaning. "There is salt between us," signifies friendship, to "eat of a man's salt" is to partake of his hospitality; "to sit above the salt" is to occupy a place of distinction. In Persia the expression "untrue to salt" means disloyalty.

Chemically salt is a compound of chlorine and sodium, and its chemical name is *chloride of sodium*; in mineralogy it is known as *halite*. A certain amount of it is necessary to the life and health of man and of animals.

Where Salt is Found. Salt is found in many parts of the world in one of three forms in ocean or lake water, in underground brine, and as rock salt. Since all rivers carry some salt the accumulation may become very great when the rivers enter a reservoir which has no outlet. It is in this way that the salt lakes have been formed, and the salt of the ocean has also probably come from the wash of the lands. We must remember that salt is really a mineral, found in the earth; its existence in water is due to solution. In the Caspian Sea the water has only 0.63% salt, the Mediterranean contains 3.37%; the Atlantic Ocean averages 3.63%; the Dead Sea has 22.30 per cent, and Great Salt Lake 23 per cent.

Rock Salt. When the quantity of water evaporated exceeds that entering a natural reservoir, the water becomes saturated, and salt will gradually be deposited on the bottom. The drying-up of lakes or the evaporation of sea water in enclosed bays has thus led to the formation of rock salt deposits. It is from rock salt that most of the world's supply of salt is obtained. Extensive deposits occur in Michigan, New York, Ohio, Kansas, California and Louisiana, and in the province of Ontario, Canada. The deposit on

Avery's Island, near New Iberia, La., covers 144 acres and is of a remarkable degree of purity. Along the Virgin River in Nevada is a bluff twenty-five miles long, over sixty



Figures Represent Millions of Barrels

PRODUCTION IN AVERAGE YEARS

Only those states are named which report over 3,000,000 barrels of salt in a year

per cent of which is salt of high grade. Extensive deposits occur in the Carpathian Mountains, and some mines there have been worked since the twelfth century. The most celebrated salt mines in the world are at Wieliczka, near Cracow, where streets and houses for the miners have been excavated from the salt. Some of these mines extend over thirty miles, and are a series of vaulted chambers supported on huge pillars of salt.

How Salt is Obtained. The simplest method of obtaining salt is by the evaporation of sea water, but this is seldom done except in countries which have no other source of supply. It consists in conducting sea water into shallow tanks and then evaporating the water by artificial heat or by the sun's rays. Underground brines are extracted by driving wells through which they are pumped to the surface. Rock salt is mined just like any other mineral. When brought to the surface it is either shipped in large lumps or put through a "breaker," or series of crushers, toothed rolls and screens, for breaking up the lumps.

It sometimes happens that rock salt is in such a geological formation that the ordinary mining methods will not do. In this case a well is bored down to the salt deposit in the same manner as an oil well. It is customary to case the well with a pipe; inside of this is put a second tubing, which usually extends to a lower depth than the outer pipe. Water is forced down between the outer and inner tubing. The water at the bottom dissolves the salt, and the solution is forced up through the inner tube. It is also possible to bore several wells, the water being forced down one and the brine up the other. The coarser grades of salt are produced by allowing the water to

Outline on Salt

- I. SOURCES
 - (1) Salt water
 - (2) Brine springs
 - (3) Rock salt
- II. PRODUCTION
 - (1) Methods
 - (a) Evaporation of sea water
 - (b) Boring wells
 - (c) Mining
 - (2) Chief producers
- III. USES
 - (1) Seasoning and preserving
 - (2) For chemicals
 - (a) Soda
 - (b) Chlorine
 - (3) Miscellaneous
 - (a) Glazing pottery
 - (b) Hardening soap
 - (c) Making glass clearer
 - (d) Fertilizer
- IV. INTERESTING FACTS
 - (1) References to salt in the Bible
 - (2) Meaning among orientals
 - (3) Arab phrases
 - (4) The Persians' method of expressing disloyalty
 - (5) Use of salt for money

Questions on Salt

What is salt?

What process causes the formation of salt deposits?

Where is most of the salt extracted from sea water produced? What is it generally called?

What are the processes of drying? By which process is the best salt produced?

Where in the United States is rock salt found? Where underground springs or wells?

For what has salt been used since the earliest times?

What are some other uses for salt?

Is salt unknown anywhere in the world?

Why are some people called "the salt of the earth"?

How does salt preserve meat and fish?

Where in the United States have large salt works been recently established?

evaporate by the sun's heat, but for the better grades artificial heat at a very high temperature is necessary. A tank is about twenty to twenty-four feet wide, one hundred feet long, and ten to twelve inches deep. The tanks rest on brick arches and the heat is supplied from grates set at one end of the tank and somewhat underneath it. Instead of using grates, hot water or steam pipes are often run under the tank. In another process the brine is poured into large kettles having a capacity of 120 gallons.

In the United States salt is found at various depths. In New York it is mined from beds of rock salt which reach a thickness of 250 feet; the beds outcrop in the central portion of the state and dip southward to a depth of 2,700 feet. In Michigan the beds lie at a depth from 1,600 to 2,200 feet. In Kansas the salt is nearer the surface, seldom being found below 800 feet. Great Salt Lake (which see) is one of the important sources of salt, and the salt works there are among the largest in the world.

Michigan has been first among the states in salt production for many years (see chart). Besides the states named in the chart, there is considerable production in Louisiana, Texas, Utah, and West Virginia.

Uses. There are various grades of salt, each designed for a special purpose. We have table, dairy, common, fine, packers', solar and other grades. The chief use of salt is for preserving and seasoning food, especially in packing meats and fish. It is extensively used in the arts in the manufacture of soda ash and carbonate of soda, for hardening soap, for glazing the coarser grades of pottery, such as jugs and crocks, and for improving the clearness of glass. It is also a source of chlorine, and on some soils it is a valuable fertilizer.

SALTILLO, *sahl teel'yo*, MEXICO, known locally as **LEONA VICARIO**, in the northeastern part of the country, the capital of the state of Coahuila, about fifty miles southwest of Monterey. Near the town is the site of the Battle of Buena Vista, a leading engagement of Taylor's campaign in the Mexican War. Saltillo is served by the National Railway of Mexico, and in normal times is a prosperous manufacturing city, producing cotton, woolen and knit goods. There is a college, the Madero Institute, a library and several Roman Catholic churches. Population, 1930, 43,235.



SALT LAKE CITY, UTAH, the capital and largest city of the state and the county seat of Salt Lake County, situated twelve miles southeast of Great Salt Lake and 742 miles west of Denver, on the Denver & Rio Grande, the Southern Pacific, the Union Pacific, and the Western Pacific railroads. It is a very important *airline center*. The site is a gently undulating plateau, at the foot of the

Wasatch Mountains, with an altitude of 4,300 feet above sea level. The city is regularly laid out, with wide, straight streets.

Features of Special Interest. The city centers about Mormon Square, or the Temple Block, which covers an area of about ten acres and is the site of the Tabernacle, the Mormon Temple and the Assembly Hall. The Tabernacle is an oval auditorium, 250 feet long, 150 feet wide and 70 feet high, with a seating capacity of nearly 10,000. The roof is supported by arches, and the acoustic properties of the auditorium are such that a person speaking in an ordinary tone of voice can be distinctly heard in any part of the room. At one end are the choir loft and the great organ, one of the finest instruments of its kind in the United States. The Temple is the most prominent structure in the city. It was nearly forty years in process of erection and cost over \$4,000,000. It is of Utah granite, and in its finishings and furnishings the interior is said to be richer than the famous Temple of Solomon. The building is 136 feet long and 99 feet wide, and each end is surmounted by three lofty towers. The Temple is closed to all except loyal Mormons, it is used for marriages, baptisms and other sacred rites.

In front of Temple Square is a statue of Brigham Young. The city has fourteen parks and playgrounds. Salt Lake City is an important station for air mail and passenger traffic. Chief among the public buildings are the county and city building, the \$2,000,000 state capitol, and the state penitentiary. Educational institutions include the University of Utah, Westminster College, St. Mary of the Wasatch, Rowland Hall, Latter Day Saints' Business College and

schools maintained by the Congregational, Protestant Episcopal and Presbyterian denominations. Churches number 137.

Salt Lake City is in the center of a rich mining region and has a number of large smelters. Industrial establishments are about 263 in number, including factories for clothing, sugar, dairy products, bakery products, canned goods; also foundries, machine shops and cement works.

History. Salt Lake City was founded in 1847 by a company of Mormons under the leadership of Brigham Young (see **MORMONS**). It was organized as a city in 1851 and was given its present name in 1868. After the discovery of gold and silver in the vicinity, Gentiles (those not belonging to the Mormon faith) began to settle in the city, and now only about 47 per cent of the population is Mormon. The city is the exact center of a great scenic area including the Grand Canyon and Yellowstone Park. The city is governed by five commissioners, one of whom is the mayor. No other city between Denver and the Pacific Coast can rival Salt Lake City in historic interest and industrial importance; it marks the conquest of discouraging physical conditions and the development of civilization amidst terrific hazards. The population was 140,267 in 1930.

SALTON SEA, *saw'l'ton*, or **SALTON SINK**, a large body of water occupying a portion of Imperial Valley in Southern California. The valley is the basin of an old inlet from the Gulf of California; its lowest point is 287 feet below sea level. It is supposed to have been shut off from the gulf by a bar formed of sediment deposited by the Colorado River, whose bed is far above the bottom of the valley. In time the water evaporated and left a large fertile area. This land, however, was useless without water for irrigation. In 1900 a company of American capitalists attempted to supply the valley with water by tapping the Colorado River and constructing a canal. But the slope of the canal was so rapid that the water soon got beyond control, and the Colorado sought the lower level by the shortest course. A lake covering an area of 500 square miles was formed. The river has been brought under control and the lake confined to an area of 190,000 acres. It is to be preserved as a permanent drainage basin for Imperial and Coachella valleys. The drainage district has been enlarged sufficiently to permit fluctuations in the level

of the water. The vicinity is designated a refuge for migratory birds.

SALTPETER, or **NI'TER**, a compound of potassium and nitric acid, known in chemistry as potassium nitrate and bearing a close resemblance to common salt. It is found native in some earths in the cave region of Kentucky and Tennessee, and in certain localities in Spain, Egypt and India, but most of the saltpeter of commerce is prepared by treating potassium chloride with sodium nitrate.

Salt peter crystallizes in transparent six-sided prisms. It has a mild, salty taste, and when taken in small quantities produces a cooling effect. For this reason it is sometimes given as medicine in fevers. It is a strong preservative, and is sometimes put in brine for preserving meat. Its most extensive use in the arts is in the manufacture of gunpowder; it is also used in making fireworks and matches; it enters into the composition of a number of fluxes for smelting ores, and is employed to some extent in dyeing.

Chile Saltpeter or **Soda Saltpeter**, is a sodium nitrate. It takes its name from the fact that extensive beds of it are found in Chile and Bolivia. It is extensively used as a fertilizer and in the manufacture of saltpeter. See **GUNPOWDER**; **FERTILIZERS**.

SALTS, **SMELLING**, a preparation of carbonate of ammonia with a sweet-scented volatile oil. See **AMMONIA**.

SALUTA'TION, formal recognition, by words or gestures, between persons upon meeting. Verbal salutations usually express a wish for the welfare of a person or an inquiry as to his health. Salutations by gesture vary with different peoples. In Western countries people shake hands or kiss each other; the Chinaman shakes his own hands; the Tibetan sticks out his tongue and pulls his right ear; the native New Zealanders rub noses. Subservience is indicated by prostrations, kneeling, military salutes, etc.

Salutations according to rank, as "Your Majesty," "Your Grace," "Your Excellency," were formerly very much in use. These still persist even in democracies, in the title "Reverend" given to clergymen and "Your Honor" addressed to judges.

SALVADOR, *sahl'va daw'r'*, the smallest, most, densely populated and most progressive of the republics of Central America, has an area of 13,176 square miles, making it a little

smaller than the state of New Jersey. The coast line is about 200 miles long and deeply indented, so that it contains a number of good harbors. Along the coast there is a low plain about fifteen miles wide, but the interior of the country is traversed by mountain groups and has a decidedly wild appearance. A number of the peaks are volcanoes, the highest having an altitude of about 8,000 feet. Izalco has been active almost continuously for more than 100 years. The rivers are few, the most important being the Lempe, which rises in Lake Guizar and flows southeast and forms a part of the boundary between Salvador and Honduras.

Climate. The climate along the coast and in the valley is hot and in many places unhealthy, but in the interior, among the hills and mountains, it is equable and healthful. There is an abundant rainfall.

Products and Commerce. The soil is usually fertile and most of the country is in a state of cultivation. The principal crop is coffee, the annual crop of which averages over 140,000,000 pounds, grown on 200,000 acres. Other important products are cotton, tobacco, sugar cane and corn. Gold, silver, copper, iron and quicksilver are found, and there are numerous mines in operation. There are no manufactures. A line of railway connects Acajutla, Santa Ana and Libertad, and another connects San Salvador with Santa Ana. One fine motor road has forced a railroad out of business.

People and Government. Three-fourths of the people are of mixed white and Indian blood, and are called Ladinos, or Mestizos; there are a few whites, and the remainder are Indians. Education is free and compulsory. Elementary schools are found in all parts of the country; there are numerous higher schools and a national university. Most of the inhabitants are members of the Roman Catholic Church but there is freedom in religious belief.

The government is republican in form, the executive consisting of a president and the legislative power being vested in a single chamber. The president is chosen for four years and is assisted by a cabinet of four members. For the purpose of local government the state is divided into fourteen departments. Salvador was formerly a possession of Spain, but it revolted in 1821 and joined the Mexican Confederation. Two years later it withdrew from this confederation and

subsequently formed part of the Republic of Central America. In 1921 it joined the new Central American Federation.

Progress has been delayed by wars with neighboring states and by revolutions and counter revolutions at home. Yet the economic development and stability of Salvador are far in advance of those of the other Central American states. A disastrous earthquake occurred in the spring of 1919, causing great loss of life and property. The capital and chief city is Salvador (which see). The other cities of importance are the seaports of La Libertad and Acajutla. Population, 1933, 1,522,186. See CENTRAL AMERICA.

SALVATION ARMY, one of the most influential religious bodies in the world. It is organized on a semi-military plan and has for its purpose the bringing of spiritual and material benefit to those whom the Churches do not reach. The organization is the outgrowth of a mission begun in East London by "General" William Booth, in 1864. Booth was a Methodist minister, and finding that the Church did not sympathize with his work among the poor, he began holding independent meetings in an unused graveyard, and organized what was first known as the Christian Mission. The present name was adopted in 1878. With the name *army* came military phraseology. Prayer was called knee-drill; the leader, a general; evangelists, officers and candidates, cadets. A semi-military attire was assumed, and barracks were built. Total abstinence is a condition of membership. The object is to attract people who would not enter church or chapel, and for this cause public houses and prisons are visited, and open air meetings are held. Since its organization the work of the Salvation Army has been expanded to include many kinds of activity, all of which are carried on under two general departments—the evangelistic and the department of social relief. The evangelistic work lies at the foundation of all other activities. In their meetings the Gospel is preached in such simple language that even those unable to read can understand the message, and strong spiritual and moral influences are brought to bear directly upon the individual.

The department of social relief maintains slum settlements, which have been likened to "lighthouses on a dark and rocky coast;" establishes rescue homes for the reclamation of fallen women, and industrial homes where

homeless and otherwise unemployed men are given work until they can find employment. Workingmen's hotels, where a poor man may find a clean bed amid wholesome surroundings, are maintained in all large cities, and free employment bureaus find work for those who need it.

Young women's boarding homes do for girls on a moderate salary what the hotels do for the men, and in addition provide home-like surroundings and enjoyable and wholesome entertainment. Other lines of work include homes for the care and training of orphan children, the giving of Christmas dinners to the poor, giving assistance to the families of prisoners and released prisoners, and the maintenance of schools for the training of Army officers and workers.

Organizations of the Salvation Army are found in eighty-eight countries and colonies, where eighty-three languages are spoken. There are 16,415 army posts in the world.

Work in the World War. Within ten days of the beginning of hostilities in 1914, the commander of the Salvation Army in England offered the services and resources of the organization to help the soldiers at the front, and a small body of workers was immediately sent to France. This number was gradually increased to a force of over 2,000, thoroughly organized and equipped for service. The American branch moved with equal rapidity. The week that war was declared the forces and resources of the Salvation Army in the United States were offered to the government, and one of its leading officers accompanied the first detachment of troops sent abroad. Others followed at short intervals, until a strong force from the American branch was in the field.

Because of their military organization and discipline, the members of the Salvation Army could more easily adapt themselves to army requirements and conditions than could the members of most other auxiliary organizations. They wasted no time on non-essentials, but seized upon every condition and circumstance possible that would enable them to carry comfort, cheer and any form of assistance to the soldiers at the front. The Salvation "lassies" were the only women admitted to the trenches, and there many of them shared the hardships and dangers of the men, serving coffee and food and caring for the wounded. In addition to this they remained for hours at a time under fire, dress-

ing the wounds of those who were injured. They established huts for social and religious gatherings and for dispensing refreshments, and maintained an ambulance and hospital service. Soldiers give praise without limit to the heroic men and women who rose to their great opportunity in the time of the world's greatest need. See BOOTH (family).

SALVINI, *Sahl've'ne*, TOMMASO (1829-1916), a famous Italian tragedian, was born at Milan. His parents were actors, and at fourteen the boy began a stage career. In four years he was playing leading rôles with Ristori. In 1849 he entered the army to fight for Italian independence, and rendered conspicuous service. After the war he returned to the stage and won praise for his performances of great classic rôles. In 1868 he organized a company with which he made many tours of Europe and America. He never learned English, but spoke his parts in Italian, even when the rest of the play was spoken in English before English audiences, yet he retained his popularity. He retired in 1890 to his home at Florence.

SAMARIA, a city of Palestine and the capital of the northern kingdom of Israel. It was built by Omri and named for Shemer, the original owner of the site (*1 Kings*, XVI, 24), and was captured by the Assyrians about 722 B. C. In the second century B. C it was entirely destroyed, but it was rebuilt by Herod the Great, who named it Sebaste. The small village of Sebastiyeh now occupies a part of the site.

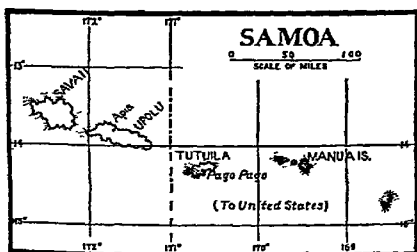
SAMARITANS, the name applied to the inhabitants of the region between Judea and Galilee in Palestine. They were a mixed people consisting of remnants of the tribes of Manasseh and Ephraim and Assyrian colonists who were brought by the king of Assyria to take the place of departed Jews after the fall of the northern kingdom. The Samaritans were strict adherents of the law of Moses, but they were regarded by the Jews as heretics, because they did not accept other parts of the Old Testament.

When the Jews returned to Jerusalem from the captivity the Samaritans wanted to assist in rebuilding the Temple, but the Jews rejected their offer with scorn. The Samaritans built a temple on Mount Gerizim, and during the time of Christ the Jews and Samaritans had no dealings with each other. During the subsequent rule of the Romans over Palestine the Samaritans were scattered.

SAMARKAND, *sam ar kant'*, a city in UZBEKISTAN, is situated on the Transcaspian Railway, 140 miles east of Bokhara. The city is divided into the native, or old, quarters and the Russian, or modern, quarters. In the native quarters is a large central square. This part of the city has narrow streets and contains a number of mosques and bazaars. The Russian quarter dates from 1871 and is constructed on a more modern plan. The city contains the tomb of Tamerlane, who formerly ruled a vast empire of which Samarkand was the center. Samarkand has a good trade in cotton, rice, silk, gold and silver wares, pottery and wines. Population, 1933, 154,600.

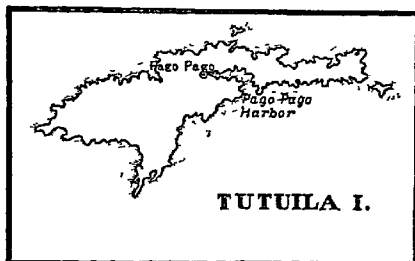
SAMNITES, several ancient tribes of Lower Italy, of Sabine stock. They were a brave, frugal and religious people, who were brought under complete subjugation by the Romans after wars waged with few interruptions for fifty-three years. When the Italian allies of Rome revolted in 900 B. C., the Samnites again fought desperately against their oppressors, but were entirely subdued by Sulla, and the tribes were almost exterminated.

SAMO'A or SAMOAN ISLANDS, formerly called **NAVIGATOR'S ISLANDS**, a group of islands in the Pacific Ocean, situated between 13° 25' and 14° 30' south latitude and between 168° and 173° west longitude. They are



4,300 miles southwest of San Francisco and 2,400 miles northeast of Sydney, Australia. The islands are fourteen in number, and are of volcanic origin. Their total area is about 1,100 square miles, and their population is about 39,000. The islands are decidedly mountainous and contain volcanic cones which rise to over 5,500 feet. The vegetation is of a tropical nature and is luxuriant. The climate, though hot, is healthful; the islands are subject to violent hurricanes, although there has not been an instance of widespread destruction in many years.

Before the World War these islands were under the control of Germany and the United States, but in 1914 a British force from New



Zealand occupied Apia, on the German island of Upolu, and within a short time New Zealand extended its control over all of German Samoa. The only islands of importance are Savaii, 660 square miles in area, Upolu, 340 square miles, and Tutuila with seventy-seven square miles and a population of 10,000. Tutuila, Manua and Swan's Island are under the administration of the United States, which maintains a garrison at Pago Pago, where there is a powerful radio station, and a well-equipped hydroplane harbor. Robert Louis Stevenson lived on Upolu for years, and his grave is on a hillside overlooking Apia.

SAMOS, *sa' mahs*, one of the principal islands of the Aegean Sea, separated from Asia Minor by a narrow strait. The area is about 289 square miles and its population, almost entirely Greek, is 65,000. It is traversed by a mountain range. Its fertile lowlands yield an abundance of raisins, fruits, mastic, corn, oil and Muscadine wine. The island also contains valuable marble quarries. It was a possession of Turkey until 1912, Greece gained it in the first Balkan War.

SAMOTHRACE, VICTORY OF See subhead, under SCULPTURE.

SAMPSON, WILLIAM THOMAS (1840-1902), an American naval officer, born at Palmyra, N. Y. At the age of seventeen he was appointed a midshipman in the United States Naval Academy at Annapolis, graduated at the head of his class in 1861 and was immediately ushered into service. In 1866 he was promoted to be lieutenant-commander, while on the *Colorado*. From 1868 to 1871 he was instructor at the Naval Academy, and again from 1876 to 1879, and from 1886 to 1890 he was its superintendent. From 1893 to 1897 he was chief of the bureau of ord-

nance, and had much to do with the building up of the navy.

Sampson was president of the court of inquiry to investigate the destruction of the Maine, and at the outbreak of the Spanish - American War was made acting rear-admiral and given command of the fleet off the coast of Cuba. He planned the blockade of Santiago harbor, but while he was away conferring with General Shafter in command of the land forces, the Spanish fleet attempted to escape. It was attacked and destroyed by the American fleet under the command of Commodore Winfield Scott Schley.

After the war Sampson was raised to the rank of rear-admiral, and given charge of the Charlestown Navy Yard. He retired in 1902 and died soon after. See SCHLEY, WINFIELD SCOTT.

SAMSON, "the Jewish Hercules," was a judge in Israel, and was famed for his great strength. His story is told in the book of *Judges*, chapters XIII to XVII. Before his birth his mother was commanded by an angel to bring him up as a Nazarite. That meant he was not to drink wine or cut his hair. He was a popular hero and an inveterate enemy of the Philistines. His peculiar gift of great bodily strength is strikingly shown in the nature of his deeds; he tore in pieces a lion; broke his bonds asunder and carried away the gates of Gaza, and slew a thousand Philistines with the jawbone of an ass. A Philistine woman, Delilah, with whom he fell in love, coaxed from him the secret that the source of his great strength was his long hair, and when he was asleep she called men who cut off his hair, depriving him of his strength. The Philistines then captured him, put out his eyes and cast him into prison. Later, at the great feast of Dagon, Samson was taken from prison to amuse the Philistines, but his hair had grown and his strength had returned, and he pulled down the building over the Philistines and perished with them. Milton made his death the subject of the drama *Samson Agonistes*. The opera *Sam-*



WILLIAM THOMAS
SAMPSON

son and Delilah, by Saint-Saens, is also based upon incidents in his life.

SAMUEL, the first of the order of prophets after Moses and the last of the judges of Israel. He was consecrated by his mother, Hannah, to the service of Jehovah, and was brought up in the Temple under the direction of Eli, the high priest. He assumed the judgeship about twenty years after the death of Eli. His administration was distinguished by the restoration of the worship of Jehovah, the defeat of the Philistines and the induction into office of Saul, the first king of Israel, whom God directed Samuel to anoint. When Saul failed in his duties, God directed Samuel to anoint David. Samuel did not live to see the end of the contest between Saul and David. See BIBLE, subhead *Bible Stories*.

Samuel, Books of, two books of the Old Testament immediately following *Judges*. They contain the history of Israel during the administration of Samuel and the reigns of Saul and David. The books were originally one, and were named for Samuel because of the prominent part he took in the history of the period. The author is unknown.

SAMURAI, *sah moo ri'*, a Japanese word meaning *guard*, defines a military caste in Japan during the feudal régime. It included the shogun, or commander in chief, the daimios, or feudal landowners, and the followers or retainers of the latter, besides a part of the middle class. When the feudal system was overthrown in 1871, the daimios and their followers were given pensions, in return for the cession of their lands to the emperor, and the daimios were thereafter known as *nobility*, while all the members of the samurai were given the title of *gentry*.

Many of the gentry became roving free lances, at times defending the helpless and oppressed, but often seeking adventure for adventure's sake. They had been taught to suspect foreigners and to preserve the traditions of Hideyoshi and other famous patriots. At times they had largely absorbed the functions of the hereditary nobles and the revolution that displaced the nobles was a sort of democratic revolt. But the Satsuma revolution was their undoing for the regular army of the emperor took from these samurai the last hope that the warrior class of old Japan, as such, might still dominate the army and navy in the new era. They have turned to business and the professions.

SAN ANTONIO, TEX., the county seat of Bexar County. It is 80 miles southwest of Austin, on the Missouri Pacific, the Southern Pacific and the Missouri, Kansas & Texas railways. Aircraft can be accommodated at Winburn Field, at four United States Army and several private landing fields. The city has an altitude of about 650 feet, with a dry and healthful climate. It contains 50 parks and plazas; the most famous of these is Breckenridge Park with more than 300 acres. Adjoining the city is Fort Sam Houston, headquarters of the Eighth Corps Area, it is one of the largest army posts in the nation.

The educational institutions consist of the large public library, nearly 50 private elementary and preparatory schools, three colleges and four junior colleges. Among the charitable institutions are the Robert B. Green Hospital, San Antonio State Hospital, county school for boys, the county training school for girls, the county home for the aged and the detention hospital. Other prominent buildings are the courthouse, city hall, Federal building, the market house, the municipal auditorium, San Fernando Cathedral, Saint Mark's Cathedral, the Spanish governor's palace, the Scottish Rite Cathedral, the Witte Memorial Museum, and four ancient missions.

San Antonio was probably first settled in the latter part of the seventeenth century. In 1718 the missions of San Antonio de Valero and of San Antonio de Bexar were founded. In 1731 a colony of people arrived from the Canary Islands. The place was then known as the Villa of San Fernando de Bexar, and this villa was made a city in 1800.

San Antonio took a most distinguished part in the Texan war of independence. The patriot army occupied the place in December 1835. The famous Alamo had been erected as a church and fortress by Franciscan missionaries, again it was occupied by Texan warriors. After a siege of two weeks it fell into the hands of the Mexican army on March 6, 1836, Santa Ana was the victorious general. Not a man of the garrison of 182 was left to describe the battle, the enemy burned the bodies of the dead but the flame of patriotism arose to the highest point. The Texans were victorious in the battle of San Jacinto; in the following April independence was accomplished. American pioneers came in greater numbers, and they were followed the next decade by Germans. The first railroad reached the city in 1878, and since then its growth has

been rapid. The commission form of government is in effect. Population, 1920, 161,379, in 1930, 231,542.

SAN BERNARDINO, *ber nahr de' no*, CALIF., the county seat of San Bernardino County, situated in a beautiful valley of the San Bernardino Mountains, 60 miles east of Los Angeles. It is on the Southern Pacific, the Union Pacific, the Atchison, Topeka & Santa Fé and the Pacific Electric railways. It has four important bus lines and the Shandin Hills Airport.

The city is surrounded by tropical vegetation, with the desert beyond, it is in the "Orange Empire." Packing, preserving and shipping fruit are among its important industries. The National Orange Show has a wide reputation. Hot water, sulphur and mud baths add to its fame as a health resort.

The important buildings are the municipal auditorium, the courthouse and the orange show buildings. The city has three hospitals, 18 churches, 19 public schools, a junior college and three parks.

The industrial establishments are the lumber mills, grain elevators, machine shops and the manufactures that produce iron and steel castings, airplanes and meat products. The city is a railway division terminal with extensive repair shops which are the largest west of Topeka.

It is governed by a mayor and council. Population, 1930, 37,481.

SAND, fine particles of quartz and feldspar loosely mixed together. Most sand has been formed by the wearing away of rock, especially sandstone, and sand is being made wherever the wind and waves beat upon any rock containing quartz and feldspar. Pure quartz sands are very valuable for the manufacture of glass, for making mortar, for use as filters, for lightening dense clay soils, for making molds in foundry and for many other purposes. Some sands contain metals, and such valuable ores as gold, platinum, tin, copper, iron and titanium often occur in sand. There are many miles of sand along the sea shore and in some inland localities, such as Dune Park, Indiana, along Lake Michigan, it is piled into hills resembling small mountains. See **SANDSTONE**.

SAND, GEORGE (1804-1876), the pen name of a celebrated French novelist and playwright, **ARMANTINE LUCILE AURORE DUPIN**, Baroness Dudevant. She was born in Paris. Her first literary venture was a novel, written

in conjunction with a young lawyer, Jules Sandeau, and published under the pseudonym "Jules Sand." From this she took her own pen name. Her published works comprise over sixty novels, numerous plays and several volumes of memoirs. George Sand embraced radical views on social questions and flitted with surprising quickness from one love affair to another. Among her novels may be mentioned *Consuelo*, *Monsieur Sylvestre*, *The Snow Man*, *The Marquis of Villemer* and *Flamaraude*.

SANDALWOOD, a fragrant wood of several species of trees native to the East Indies and the Malayan and Polynesian islands. Its wood is manufactured into glove boxes and other articles of ornamental nature. It is largely used as incense in worship by Brahmans and Buddhists. There are several species which furnish sandalwood, the common being the white sandalwood, which comes from the mountains in South India and the islands of the Indian Ocean. Sandalwood oil, after distillation, is used in perfume.

SANDBURG, CARL (1878-), born in Illinois, notable among the minor poets of America, but best known for a biography, *Abraham Lincoln: The Prairie Years*, published in 1926. This is recognized as one of the best characterizations of Lincoln that has appeared. He also wrote *Abe Lincoln Grows Up* (1928), and *Mary Lincoln, Wife and Widow* (1932), the latter in collaboration with Paul M. Angle. Sandburg won several prizes for his poetry from the Poetry Society of America.

SAND EEL, or **SAND LANCE**, a group of fishes characterized by long, slender cylindrical bodies resembling that of an eel. They vary from four inches to a foot in length, are of a beautiful silvery luster, are destitute of ventral fins, and their scales are so small that they can scarcely be seen. Sand eels swim in schools near the shore and bury themselves in the sand. They are found along the coast of North America from Labrador to New York, and are largely used as bait for cod.

SAND'ELLING, a bird resembling the common sandpiper, but differing from it in that it lacks the hind toe. It breeds in the Arctic regions of both hemispheres and migrates to the southern sections of South America and Africa, but many winter in the Southern states. The feathers of the head and neck are gray, edged with lighter color and

spotted with brown, and the lower parts are white. These birds are found along the seacoast, especially during the migrating season, running in the surf.

SAN DIEGO, *sahn de a' go*, CALIF., the county seat of San Diego County, is situated on San Diego Bay, the only land-locked harbor between Panama and San Francisco. It is 125 miles southeast of Los Angeles on the Atchison, Topeka & Santa Fé and the San Diego & Arizona Eastern railways. It is served by one electric railway and four principal airports. It is the terminal also of eight primary highways. Many transoceanic steamship lines call at San Diego. The city is beautifully situated on ground sloping towards the bay. The streets are broad and ornamented with a wealth of shade trees. There are 24 parks; among them is the Plaza at the business center and Balboa Park of 1,400 acres where the Panama-California Exposition of 1915-1916 was held.

Among important buildings are the permanent exposition buildings, the Federal building, the courthouse, the State Teachers' College, the Carnegie library, the Masonic Temple and 150 churches. The city also contains the San Diego Army and Navy Academy, the Scripps Institution of Oceanography, a Fine Arts Gallery, a great U. S. Army aviation station, Marine Corps base, the Fleet Repair base, 32 private schools and nine public high schools. Hotel del Coronado situated on a neck of land protecting the harbor, with its Japanese gardens and Tent City, is a widely-known winter resort.

San Diego is famous for pioneering in aviation; in 1924 the first commercial line on the Pacific Coast was established. An average of more than 400 planes are stationed at the city.

It has a large export and import trade. The leading industries deal in citrus fruits, fruit and meat products, tuna fish, olives, onyx, marble and granite, flour, airplanes and toys. The city is governed by a mayor, council and city manager. There four daily newspapers and about 90 commercial and social clubs.

The first mission founded in California by the Franciscan Fathers was established at San Diego in 1769, and the Spanish town was organized in 1835. The present city has grown chiefly since 1900. Population in 1920, 74,361; in 1930, 147,995.

SAND'PAPER, a material for smoothing and polishing, made of a stout paper coated with sharp sand embedded in glue. It is

intermediate between glass paper and emery paper in its action on metals, and is less effective than glass paper on wood. Steel wool is now largely used as a substitute for sandpaper.

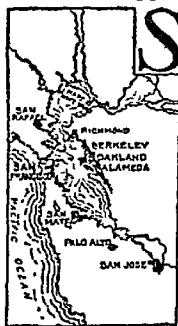
SANDPIPER, a small snipe, of which there are about thirty species, found in all parts of the world. They live on the shores of the sea and on the banks of rivers, and seek their food by thrusting their long bills into the soft mud for worms and small mollusks. In winter they migrate to the South in flocks, changing their plumage with the change of seasons. The voice of sandpipers is shrill, but cheery. The eggs, usually three or four, are drab, olive, or buff, heavily spotted with dark brown. The *pectoral sandpiper*, called also the *jacksnipe*; the *purple sandpiper*, and the *spotted sandpiper*, or *tectetail*, are the most common of the species of the United States.

SANDSTONE, a rock composed of grains of sand, cemented together by some other mineral. The cementing mineral may be limestone, clay, oxide of iron or silica. Sandstone is abundant in many localities. It is found in the valley of the Connecticut River, in northern New York, in sections of Ohio, Michigan and Iowa and in many other places. It varies in color from light gray and bluish-gray to dark brown. That found near Cleveland, Ohio, is gray; that near Potsdam, N. Y., a dark red. Sandstone is used for a variety of purposes. Certain fine-grained sandstone makes excellent grindstones and whetstones. Some varieties are soft when quarried, but harden on exposure to the air. The rock is easily quarried and worked, and forms one of the most valuable building stones. The famous "brown stone fronts," formerly so fashionable in large cities, were of sandstone.

SANDUSKY, OHIO, the county seat of Erie County, 53 miles west of Cleveland on Lake Erie, and on the New York Central, the Baltimore & Ohio, the Pennsylvania, the Cleveland, Cincinnati, Chicago & Saint Louis, and the New York, Chicago & St. Louis railroads, and it has two airports. The city has an excellent harbor and trade with other lake ports. The surrounding region is fertile; grapes are extensively cultivated; fishing is also an important industry. The principal manufactures are baskets and crates, strawboard, crayons, iron and steel products, automobile accessories, light bulbs, and chemicals.

There are large machine shops, coal and lumber yards. A state soldiers' and sailors' home is situated here. Prominent structures are the Federal building, the courthouse, the county infirmary, the Carnegie library, two hospitals, and a Masonic Temple. Cedar Point and Put-in-Bay, a few miles distant on Lake Erie, are popular summer resorts. Sandusky is the leading fresh water fishing port in the United States. Here also history reaching back for three centuries is made visible. Sandusky was settled in 1817 and was incorporated in 1845. The commission-city manager form of government is in operation. Population, in 1930, 24,622.

SANDY HOOK, a narrow peninsula, which projects northward from the coast of New Jersey and partly encloses New York Bay. It is about six miles long, is low and sandy, scarcely above sea level, hence the name. The first lighthouse here was built in 1762. Ocean liners pass north of Sandy Hook when approaching New York.



SAN FRANCISCO, *san fran sis'ko*, CALIF., one of the chief seaports of the Pacific coast, is situated on the peninsula between San Francisco Bay and the Pacific Ocean, which extends to the Golden Gate, on the north. The city's area is 42 square miles and comprises the County of San Francisco. It is laid out on hills, which are separated by nearly parallel valleys, and presents a most picturesque appearance, whether seen from the ocean or the bay. It has broad streets and boulevards and many beautiful trees. The residence section is filled with fine mansions, especially along the high ridge, which is parallel to the bay, extending toward the Golden Gate. Along the ocean is a high ridge of sand dunes, which serve to protect the city from the winds.

Plan of the City. Market Street, the principal thoroughfare, extends from the Ferry Building southwest to the vicinity of Twin Peaks, and divides the city into two nearly equal divisions. South of Market Street is the older part of the city, frequently known as the *Mission*, because a Spanish mission was founded in the locality. The two districts are usually known as *North of Market Street*.

and *South of Market Street*. The north district contains the chief residences, the higher class retail stores, the financial and export center and the Chinese and Italian quarters; the wholesale and manufacturing interests have assembled in the south district.

Nearly all lines of business radiate from the Ferry Building, situated on the water front. Ferries with over 170 arrivals and departures daily cross the bay. At this point are the headquarters of the State Chamber of Commerce and the State Mining Bureau, with exhibits of mining and agriculture. North and south of this building are extensive docks.

The retail district includes Market Street and Geary, Kearny, Post and Sutter streets; the intersection of the first three is the business center, marked by Lotta's Fountain. Here are many of the large buildings: the Stock Exchange, the Standard Oil and the Shell Oil buildings, the Russian building, the Financial Center offices, the Pacific National Bank building. Other structures of importance are the Admiral Dewey monument in Union Square, the Federal, the Hobart, the Pacific buildings, the Humboldt Savings Bank, the Mutual Savings Bank, the Merchants' Exchange, the Chronicle and the Hearst offices. Among the greater hotels are the Palace, the Saint Francis, the Fairmount, the Mark Hopkins, and the Sir Francis Drake. The Civic Center, beginning at the intersection of Market and Van Ness Avenue, is surrounded by a group of magnificent structures—the city hall, the municipal auditorium, the Civic Opera House, the Legion Memorial, the California State building and the public library with its 500,000 volumes. There also five endowed libraries in the city. Club headquarters are concentrated in the vicinity of Post and Mason streets. There are two public and several private art galleries and 250 churches. There are eight broadcasting stations in the city.

Chinatown. Within the heart of San Francisco occupying 10 city blocks is a foreign city, Chinatown, with some 8,000 Chinese residents. The hideous buildings of an earlier day were replaced by modern structures after the great fire in 1906. Other areas are occupied by Japanese, Greek, Mexican and Spanish colonies. Life in foreign lands has been thus transported to American soil with its customs, religious ceremonies and domestic atmosphere.

Parks and Boulevards. There are 42 parks

and 50 playgrounds in the city. Golden Gate Park is world-famed; it contains 1,013 acres and extends inland for four miles, a strip one mile wide. It contains the Stenhardt Aquarium, the De Young Memorial Museum, the Japanese Tea Garden. The Fleishacker Playfield fronting the Pacific Ocean contains one of the largest outdoor swimming pools in the world. It presents many beautiful drives and walks among shady trees, flowers, streams and quiet pools. Lincoln Park in the northwest part of the city is on elevated ground and affords a fine view of the entrance to the harbor. The Presidio, a military reserve and training ground, joins it on the east; farther east is Fort Mason.

The extensive beach on the ocean front is a popular resort for bathing; at the north end stands Cliff House, built on a projecting ledge of rocks, near the Seal Rocks which are frequented by sea lions. Beach Boulevard, beginning at the Cliff House and extending southward for miles, is one of the chief highways of the city. On a hill overlooking the Cliff House are the Suto museum and gardens, noted for their baths and statuary.

Education. There are 186 public schools under the direction of the department of education of San Francisco. Thirteen institutions in the city give degrees; 21 colleges and universities are within commuting distance. The University of California is at Berkeley, Stanford University at Palo Alto and San Francisco University is within the city itself. Other institutions include the Teachers College, Cogswell Polytechnic College, Mills College, and the Conservatory of Music. The University of California is reported as the second largest in the United States and Stanford is one of the richest in the world.

Commerce and Industry. According to the census the wholesale trade of San Francisco surpassed that of any other Pacific Coast city by more than \$400,000,000; as many at 3,154 establishments have been engaged at one time in wholesaling. Foreign trade has been carried on by scores of steamship lines; four transcontinental railways have assisted in the domestic trade.

Bridges. Two of the world's greatest bridge projects neared completion late in the year 1936. They are of the suspension type. One links the city with Oakland; the other stretches across the Golden Gate and connects the city with the heretofore isolated counties to the north.

The city is one of the largest manufacturing centers in the country, more than 2,200 establishments have been listed. San Francisco-Oakland lead in canning, cheese, salt, edible oils, printing and publishing, and washing machines. Next in order are men's clothing, nuts, coffee and spice, machinery, gold leaf and foil, macaroni, mattresses and bed springs. San Francisco has one of the largest dry docks in the country, and several large shipyards in and near the city have given employment to thousands of men.

Normally 44 truck transport companies operate in this area. There are four air terminals. Five major bus routes serve the city.

History. San Francisco Bay was discovered by Portala in 1769, and a mission was established by the Franciscan friars in 1776. Soon after, the Spanish government stationed a garrison here. There was but little growth in the settlement until after the discovery of gold in 1848. With the influx of people consequent upon this discovery, San Francisco suddenly sprang into prominence.

On April 18, 1906, a fire in three days devastated four square miles in the heart of the city. The damage to property exceeded \$200,000,000, and 450 people lost their lives. Plans were at once perfected for rebuilding the city on a greatly-improved plan, and in less than 10 years the devastated part of the city was rehabilitated with substantial steel-frame buildings. The Panama-Pacific International Exposition was held in San Francisco in 1915, and this brought thousands of people to the city from all parts of the world.

Population. The population of San Francisco is remarkable for its cosmopolitan character, and like the populations of New York and Chicago, it contains representatives of almost every nationality in the world. In 1900 the city had 342,000 inhabitants, and it grew rapidly until 1906, when the earthquake and fire caused a loss of about 100,000. However, a majority of those who left soon returned, and others have come, so the city has regained more than it lost. Population, 1930, 634,394.

SANHE'DRIN, the chief council of the Jews, originally having power over religious, criminal and civil cases. After the Romans assumed control of Palestine, however, their power was restricted to religious matters. At the time of Christ the Sanhedrin was com-

posed of seventy-one members. It met daily in the Temple and was presided over by the high priest. Only Israelites of good character and well versed in the law could become members. The Sanhedrin tried Christ, and Stephen, Paul, Peter and John were brought before it on charges of heresy. After the fall of Jerusalem in A. D. 70 it disappeared.

SANITARY SCIENCE, an application of science that procures and maintains external conditions favorable to human health and comfort. It is closely connected with the practice of medicine and with several branches of engineering. Its primary concern is not the individual person as such but plans are made on a large scale so that injurious factors may not threaten the entire community.

The states, the municipalities and the Federal Government have passed laws for the guidance of the people in matters of health. Men highly trained and carefully examined as to their qualifications are secured to administer these laws and to educate the public in sanitation. Men of this character are placed on the national, state and local boards of health, others are employed as health officers and inspectors of many types.

The many problems involved are indicated by the following subjects: water used for whatever purpose, sewage and other wastes, conditions as to light, heat, and safety; quality of foods and drinks, epidemic diseases, noxious insects, cleaning of streets, halls, churches, theaters, hotels, dwellings, factories, stations and public grounds; nuisances whether of private or public origin such as noises, housing and slaughtering of animals, odors, disposal of dead animals and persons, slums, old buildings; vaccination, school hygiene, infant welfare, occupational disease, public health nursing, camp sites, building plans, comfort stations, beaches, equipment used for amusements, barber shops, and medicines sold to the public.

Related Articles. The various phases of this subject are fully treated in these volumes under the following headings:

Adulteration	Disease
Antiseptic	Gen. Theory of
Aqueduct	Heating and
Bacteria and	Ventilation
Bacteriology	Hygiene
Bath	Inoculation
Breathing	Medicine
Domestic Science	Mosquito
Drainage	Physical Culture
Filter	Quarantine
Fly	Serum Therapy
Food	Sewage and Sewerage
Fumigation	Tenement
Garbage	Vaccination
	Water

SAN JOAQUIN, *ho ah keen'*, a river of California having its source in a glacier in the Sierra Nevada Mountains, in the southwestern part of the state. It flows southwest, then northwest, and joins the Sacramento just before that stream enters Suisun Bay. Its length is about 350 miles; it is navigable to Stockton throughout the year, and during high water about 200 miles farther for small boats. The San Joaquin Valley is one of the most fertile regions in California.

SAN JOSE, *ho za'*, COSTA RICA, the capital of the republic of Costa Rica, is situated about forty-four miles east of Punta Arenas, a port of the Pacific, and sixty-eight miles west of Limon, on the Atlantic coast. It is on a line of railway connecting these ports. The town is well built, has wide, paved streets and electric lights. The most prominent buildings are the cathedral, the national museum, a school of law, the national library and the Institute of Physical Geography.

San José is situated about 3,800 feet above sea level, has a healthful climate and a pure water supply and is the center of a rich agricultural region. It was founded in 1738 and was made the capital of the country on the establishing of independence in 1823. Population, 1934, 53,242.

SAN JOSE, CALIF., the county seat of Santa Clara County, nearly fifty miles southeast of San Francisco, on the Guadalupe River, seven miles from San Francisco Bay, and on the Southern Pacific and Western Pacific railroads. Here are located San Jose State College, Amore College and Rosierucan Museum, and in adjoining Santa Clara is the University of Santa Clara; there is also a business college and a parochial school. Other prominent buildings are a city hall, a courthouse, a hall of records, a postoffice, a large hotel, an armory and an auditorium. The city has two libraries and many public parks. The Lick Observatory is on Mount Hamilton, eighteen miles to the west. Alum Rock Park, with its mineral springs and natatorium, seven miles distant, is also of interest. Large quantities of fruit and grain are raised in the valley, and fruit-packing is one of the most important industries of the city. There are also foundries, marble works, and fruit drying and canning. There are in the city a total of nearly 400 industries. A Spanish town was founded here in 1777, and the mission of San José was established two years later. United States troops took

possession of the place in 1846, and it was the capital of California from 1849 to 1851. Population, 1930, 57,651.

SAN JOSE SCALE, the most destructive of scale insect pests, was introduced into America from China, but takes its name from San Jose, Calif., where it was first discovered. The insect is so small that it usually makes great headway before being discovered, the largest scales being no larger than the head of a pin. The color is gray, and an infested tree looks as though it were covered with ashes. The scale is particularly destructive to fruit trees, and causes hundreds of thousands of dollars' loss every year. It is estimated that a single female scale may produce over 3,216,000,000 young in a year. The scales are blown about by the wind and are carried by birds and insects; it is therefore impossible to confine them to a single tree or orchard. Spraying the trees with a mixture of lime, sulphur and salt, or with a solution of whale-oil soap containing potash lye, or a mixture of kerosene soap or crude petroleum and hydrocyanic acid gas, is the best means of destroying the insects. The ladybird beetle is a persistent enemy of the San José scale.

SAN JUAN, *hwahn*, PORTO RICO, the capital, largest city and chief seaport of the island, is situated on a small island on the north coast of Porto Rico and connected with the mainland by five bridges. The city is surrounded by a wall, built two hundred fifty years ago. It has an excellent harbor, is regularly laid out and contains a number of plazas and squares. Since the occupation of the island by the United States, the sanitary conditions have been greatly improved. The streets are narrow, the houses are mostly constructed of stone and are of a massive style of architecture. The principal buildings are the Capitol, the city hall, the theater, the hospital, the palaces of the Governor and the bishop, a Carnegie Library, and the School of Tropical Medicine. The city also has a large market place. It is an important center of tobacco manufacture. Population, 1930, 114,715. See PORTO RICO.

SANKEY, IRA DAVID (1840-1908), an American evangelist, singer and composer, born in Edinburg, Pa. He was chiefly known for his association with Dwight L. Moody, whom he first met in Indianapolis in 1870. Sankey had a fine baritone voice, and for many years conducted the singing for Moody's evangelistic work.

SAN LUIS POTOSI, *loo ees'po toh se'*, MEXICO, capital of the state of San Luis Potosi, and fourth city of the republic of Mexico, is situated 215 miles northwest of Mexico City on a plateau 6,200 feet above the sea. It is regularly built, has good streets and several plazas, or parks. The most important buildings are the governor's palace, the palace of justice, the townhall, the mint, the exchange, the theater and the Church of San Pedro. The city is an important railroad center and has a large trade in cattle, hides, tallow and wool. It is the seat of a United States consul.

The city first attained its prominence because of its proximity to the famous San Pedro silver mines, which have been abandoned. At present there is a good trade in pottery, mineral products and hides. The manufactures include furniture, woolen goods, soap and cigars. The city was the center of a revolution which broke out in 1910, and was captured by the Constitutionalists in 1914. Population, 1930, 73,205.

SAN MARINO, *sahn mah re'no*, a tiny republic, the oldest in Europe, situated in Northern Italy, about twelve miles from the Adriatic. It has an area of about thirty-eight square miles and a population of about 13,500. The chief industries are wine-making and cattle-raising. The legislative body of the republic is a Council of sixty members, elected by popular vote. From among these is chosen annually a smaller executive council and, semi-annually, two executive officers called regents. The republic issues its own postage stamps and copper coins. There is no public debt. San Marino, the capital, situated 2,650 feet above the sea, is a quaint old town, which has existed since the fourth century. A treaty of friendship exists between the republic of San Marino and Italy, and when the latter declared war against Germany in 1915, the little republic followed suit and sent a thousand men to the war.

SAN MARTIN, *sahn mahr teen'*, JOSE DE (1778-1850), a distinguished South American general and a leader in securing South American independence, was born in Argentina. He entered the army and gained distinction in the war against France, rising to the rank of lieutenant-colonel. In 1811 he learned that the Spanish colonies in South America had rebelled, and at once went to Buenos Aires, organized a group known as the mounted grenadiers, and was given command of a

large patriot army. In 1815 he raised an army for the liberation of Chile, but did not reach that country until two years later. He won two important victories over the Spanish forces, one at Chacabuco and the other at Maipo in 1818. After organizing the government of Chile, he helped the Peruvians to gain their independence, and was made Protector of Peru. While in office he instituted a number of needed reforms, then turned his office over to Simon Bolivar (which see), and sailed for Europe, where he died.

SAN SALVADOR, CENTRAL AMERICA, capital of the republic of Salvador, 120 miles southeast of the city of Guatemala. The city occupies a valley between wooded hills, and to the northwest is the volcano of San Salvador. A railway connects the city with Santa Ana and La Libertad. The chief buildings are the national palace, the university, the cathedral, the national library and an astronomical observatory. The city also has a botanical garden. Its trade in agricultural produce is considerable, and it ships large quantities of indigo. Population, 1932, 98,555.

SANSKRIT LANGUAGE AND LITERATURE. Sanskrit is the classic and sacred language of the ancient Hindus, and the language in which most of their vast literature is written. The date of the introduction of Sanskrit into India is unknown, but it was at least as early as 1500 B. C. It has not been a living and spoken language since 200 B. C., so the ancient forms have been preserved without change. It belongs to the Indo-European family of languages, and is related to the Persian, Greek, Latin, Teutonic, Slavonic and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin does to the languages of Southeastern Europe that are known collectively as the *Romance* languages.

The great value of Sanskrit to the student of languages lies in the fact that through all the centuries it has preserved without change the characteristics of the common language from which the modern languages of India and Europe sprang (see *PHILOLOGY*). It has exercised great influence on the scholarship of the world, for its study has led to the study of comparative philology, comparative mythology and comparative religion. Moreover, scholars have arrived at an understanding of the development of Greek, Latin, German, and English largely by comparing them with Sanskrit.

The literature may be divided into two great divisions—the *Vedic*, represented by the *Vedas*, or sacred books of the Hindus, and Sanskrit proper, in which secular works are written. The *Vedic* is the older, and is sometimes called *Old Sanskrit* (see *VEDAS*).

Many of the fables about animals and the fairy tales that have gladdened the hearts of children in Europe and America for centuries were originally taken from the Sanskrit.

SANTA ANA, CALIF., the county seat of Orange County, thirty-three miles southeast of Los Angeles, on the Southern Pacific and the Santa Fé railroads and an electric line. The city is in the midst of one of the most fertile regions in Southern California. The industries include the canning of fruit and vegetables, the manufacture of beet sugar and flour, the dressing of lumber, the making of collar pads and the manufacture of soda. Newport Beach is eight miles distant. Population, 1920, 15,485; in 1930, 30,322, a gain of 96 per cent.

SANTA ANNA, or SANTA ANA, sahn'ta-ah'na, ANTONIO LOPEZ DE (1795-1876), a Mexican general and politician. He entered the army early, took a prominent part in the expulsion of the Spaniards from Mexico and was at first a supporter of Iturbide. Later he went over to the republicans and helped to overthrow Iturbide. He was in the front during all the subsequent Mexican troubles till 1833, when he became president. By 1835 he had made himself practically the dictator of Mexico. In 1836 Texas seceded, and in the war which followed Santa Anna, after a victory at the Alamo, was defeated at San Jacinto by Houston and taken prisoner. In the following year he was released, on condition of recognizing the independence of Texas. In 1841 he was again made president, but three years later his opponents captured him and banished him to Havana. Recalled in 1846, he was again made president, and during the war with the United States he commanded the Mexican army (see *MEXICAN WAR*). Owing to his repeated defeats, and especially to the capture of Mexico City, he resigned and left the country. He was recalled again in 1853 and was made president, but two years later he was again driven from the country. He returned after the death of Juarez, and died in obscurity in Mexico City.

SANTA BARBARA, bahr'ba ra, CALIF., the county seat of Santa Barbara County, 100 miles northwest of Los Angeles, on the Santa

Barbara Channel and on the Southern Pacific railroad. The city is picturesquely located on a slope above the bay, has a warm, equable climate and is visited by many tourists and health-seekers. The luxuriant growth of flowers, tropical plants and fruits helps to make the city a delightful residence place. The old Franciscan mission here was established in 1786. It is one of the most important and the best-preserved in California, and it is the only one in which services never have ceased to be held. Other prominent buildings are Saint Anthony's Seminary, State College, and an art gallery, hotels, two hospitals, the Arlington and Potter hotels and a public library. Large quantities of beans, English walnuts, lemons and olives are grown in the neighborhood, and the city ships considerable fruit, live stock, wool, and various minerals. Santa Barbara was settled by the Spaniards in 1782, and was incorporated as a city in 1874. The commission form of government is in effect. Two airports are available, eight and twelve miles distant. Population, 1920, 19,441; in 1930, 33,613.

SANTA CLAUS, klaws. See *NICHOLAS, SAINT*.

SANTA CRUZ, krooth, CALIF., the county seat of Santa Cruz County, seventy-five miles south of San Francisco, on the Bay of Monterey and on the Southern Pacific Railroad. There are also steamship lines for coastwise commerce, and an airport. The city is located on a slope above the bay, has an equable climate and is one of the most popular resorts for tourists in the central part of the state. It contains a good bathing beach, picturesque drives and a large public park, overlooking the bay. The surrounding region produces large amounts of fruits, and the city contains a powder mill, and manufactures cement, asphalt, lumber and other goods. It has a large public library. Not far distant are Sequoia Park and Big Tree Forest. The place was settled by Franciscan missionaries in 1791, and the city was incorporated in 1876. The commission form of government is in effect. Population, 1920, 10,917; in 1930, 14,395.

SANTA FE, fay', ARGENTINA, the capital of Santa Fé province, on the east bank of the Salado River, 230 miles northwest of Buenos Aires. It is connected with numerous cities by rail, and is the seat of a normal school, a Jesuit college, a university and a seminary. It is an important shipbuilding center and

has considerable trade in cattle, hides and lumber. Population, 1931, 125,295.

SANTA FE, *san'tah fa'*, N. M., the capital of the state and the county seat of Santa Fé County, twenty-one miles east of the Rio Grande River, sixty miles northeast of Albuquerque, on the Denver & Rio Grande, and the Atchison, Topeka & Santa Fé railroads; there is an airport. The site of the city was first visited by Spaniards about 1542, when they found a large pueblo, containing some 15,000 Indians. About 1605 the Spaniards found the place deserted and made a settlement, enslaved the neighboring Indians and opened up extensive gold and silver mines. In 1680 the Indians captured the place, but the Spaniards regained possession in 1692. It was taken by United States troops in 1846. In 1851 it was made the capital of the newly-organized territory and was chartered as a city in 1890. Next to Saint Augustine, Fla., it is the oldest white settlement in the United States.

Santa Fé is beautifully situated on a plain almost 7,000 feet in elevation, and is surrounded by mountain peaks rising to heights of from 10,000 to 13,000 feet. The old Spanish section has narrow, crooked streets, and the buildings are low, one-story adobe structures. The modern part has wide streets and contains many good business blocks and fine residences.

In the center of the city is a public square, known as the Plaza. Facing this on the north is the old governor's mansion, a one-story adobe building, about a square in length, containing an inside court, and built in the early part of the seventeenth century. Also of historical interest are the Church of San Miguel, old Fort Marcy, Rosario Chapel, the partly rebuilt Cathedral of San Francisco, and a Scottish Rite Cathedral. The educational institutions include the Saint Michael's College, Loretto Convent, Allison Mission, Mary E. James Mission School, the Laboratory of Anthropology and the government and Saint Catherine's Indian schools, and a school for the deaf and dumb.

In the vicinity are kaolin mines and deposits of coal, but stock raising is the most important industry. The city is principally engaged in wholesale and retail trade with the surrounding region. Population, 1930, 11,176.

SANTAYANA, *sahn tuh yah'nah* **GEORGE** (1863-), American philosopher and poet, noted for the beauty and mastery of his

English style. Born in Madrid, of Spanish parentage, he was brought to Boston at the age of nine. As an under-graduate at Harvard he began his study of philosophy, where he taught, from 1905 to 1912, mainly the history of philosophy. In later years he lived in various European cities, practically in seclusion.

At intervals after the publication of his first volume of verse, *Sonnets, and other Poems* (1894), small books of his classically compact and beautiful poetry appeared. His many philosophical writings include *The Sense of Beauty, Three Philosophical Poets, Winds of Doctrine, Platonism and the Spiritual Life*. His fame, however, rests on a five-volume series of books, *The Life of Reason*. All these works reveal a detachment, serenity, and peace, despite his deep rational sense of and sympathy with the tumultuous conditions of modern life.

SANTIAGO, *sahn te ah'go*, **CHILE**, the capital and largest city of the republic, is situated on a beautiful valley between the Andes and the Chilean coast range, on a branch of the Maipo River. It is sixty-eight miles southeast of Valparaíso. The city is well laid out, the streets are paved and lighted by electricity, and there is an excellent electric street railway system. The city contains a number of public buildings of modern construction and these add much to its beauty. Among them are the hall of congress, the mint, the exposition palace, the academy of sciences, the national library and the national museum. The city contains a number of educational institutions, among them the University of Chile, founded in 1743, and a normal institute. There are also a botanical garden, an observatory and a number of beautiful parks. The manufactures are of little importance. Santiago was founded in 1541 by Pedro de Valdivia. Santiago has railway connection with Valparaíso, Concepción and Buenos Aires. Population, 1932, 702,431.

SANTIAGO, BATTLE OF, a naval battle during the Spanish-American War, fought off Santiago de Cuba, July 3, 1898, between a United States squadron, under Sampson and Schley, and a Spanish fleet, under Admiral Cervera. The Americans had confined Cervera's squadron to the harbor of Santiago for several weeks, while the land forces were completing the investment of the city. Cervera was ordered by his government to at-

tempt to make his escape, and on the morning of July 3 he led a dash from the harbor. After a running fight lasting most of the day, all the Spanish vessels were beached or destroyed, and Cervera and 1700 men were taken prisoner, while 350 Spaniards were killed and 160 wounded. The American loss was one man killed and ten wounded. See **SPANISH-AMERICAN WAR**.

SANTIAGO DE CUBA, the third city and seaport of Cuba, is situated on an excellent harbor on the south coast of the island, 470 miles southeast of Havana, with which it is connected by rail. The harbor is entered through a narrow channel, which is defended by forts. Its chief buildings are a cathedral and a government palace, a theater and military and other hospitals. The city also has a number of charitable and industrial institutions. It is situated in the midst of a rich agricultural district and exports sugar, hides, wax, tobacco and copper and iron ore. There are a few iron foundries and machine shops and tobacco factories. The town was founded in 1514; it was the chief point of attack by the Americans during the war with Spain and was captured by them July 3, 1898. It was from this harbor, also, that the Spanish fleet attempted to escape at the time of its capture by the United States squadron (see **SPANISH-AMERICAN WAR**). Population, 1933, 103,497.

SANTO DOMINGO, since 1936 Ciudad Trujillo (City of Trujillo), renamed in honor of the dictator then in power, the oldest existing European settlement in the New World and capital of the Dominican Republic, is situated on the southwest coast of the island of Haiti. It is a typical Spanish city, surrounded by an old wall, built in the early days as a defense against pirates and natives. Most of the inhabitants dwell in thatch-covered houses; ruins of stone mansions, however, give some idea of the former grandeur of the place. The most interesting building is the Cathedral in which Columbus and his son were formerly buried. The city was founded by Bartholomew Columbus, in 1496; several times earthquakes have partially destroyed it. It is an important center for the export of coffee and sugar. Population, 1932, about 45,000.

SANTO DOMINGO, officially known as **THE DOMINICAN REPUBLIC**, occupies the larger (eastern) portion of the island of Haiti. Its area is 19,332 square miles, mak-

ing it about twice the size of the state of Maryland. (For physical features, see **HAITI**.) Most of the land is suitable for cultivation, and in the south and west there are some large plantations. The chief products are sugar cane, coffee, cacao and tobacco. A considerable area is covered with forests of valuable timber, such as mahogany, satinwood, cedar and logwood. There are some minerals, including gold, iron, copper and coal, but they have not been worked.

The inhabitants are a mixed race of Spanish, Indian and negro descent. The Spanish language is in general use. The prevailing religion is Roman Catholicism. Santo Domingo became an independent republic in 1844, and adopted a constitution, which was last revised in 1934. The executive branch of the government consists of a **P**resident, chosen by an electoral college for four years, and his Cabinet of seven ministers. The legislative branch consists of two houses, a Senate of twelve members, elected for six years, and a Chamber of Deputies, of thirty-three members, elected for four years. Each province is administered by a governor appointed by the President.

The state maintains high schools and normal schools, and throughout the republic primary education is practically compulsory. There are about 230 miles of railroad and 1,035 miles of telegraph lines. At the capital are two banks, the National Bank of Santo Domingo and a branch of the Royal Bank of Canada, which also has a branch at Pedro de Macoris. Most of the trade is carried on with the United States, which in 1905, in accordance with a friendly treaty, assumed charge of the customs until 1924 to bring about a settlement of the obligations of citizens to foreigners doing business in the republic. The United States put down a revolt in 1913 and another in 1915. As a result of the impeachment of President Enrique Jimenez a revolt occurred in 1916 which the United States suppressed. Afterward it put the republic under martial law. In June, 1917, Santo Domingo took the side of the allies and severed diplomatic relations with Germany. Population, 1932, 1,200,000.

SANTOS, *sahn'tos*, **BRAZIL**, on the Atlantic Ocean, thirty miles southeast of São Paulo. It has a deep harbor, and, next to Rio Janeiro, is the most important seaport of the country. The city is well built and has good streets and a number of parks, as well as public institu-

tions of importance. It is the world's chief port for the shipping of coffee, the number of sacks exported yearly being nearly about nine million. Population, 1930, 100,000

SANTOS-DUMONT', ALBERTO (1873-1932), a French aeronaut, who became famous in the early days of aerial navigation. He was born at São Paulo, Brazil, and was educated in France. He inherited a large fortune, most of which he devoted to experiments in air navigation, making his first successful flight with a dirigible in 1899. For this feat he was given the Henri Deutscher prize of 100,000 francs. He was made a Chevalier of the Legion of Honour in 1904, and Officer in 1904. His account of his experiments, *My Airships: A Story of My Life*, was published in 1904. See FLYING MACHINE.

SAO FRANCISCO. See SAN FRANCISCO (river).

SAONE, sone, a river in the eastern part of France, which rises in the department of Vosges, flows southwest, then south, and joins the Rhone at Lyons. It is a link of an extensive waterway, being navigable two-thirds of its 300 miles and connected by canal with the Seine, the Meuse, the Rhine, the Loire and the Moselle. Chalon-sur-Saône, one of the largest industrial cities of France, is on its banks.

SAO PAULO, BRAZIL, the capital of the state of São Paulo, and second city of the Republic, is situated 210 miles southwest of Rio de Janeiro, and twenty-five miles from Santos, its seaport. The city is on a plateau, and has a mild and healthful climate. São Paulo is rapidly-growing, is modern in every respect, and has the reputation of being one of the cleanest cities in North and South America. The city has long streets traversed by street railways, lined with busy shops and lighted by electricity. The cathedral, the government building, the treasury, the Episcopal palace and the Ypiranga Palace, erected to commemorate the Declaration of Independence, are the most important buildings. There is a large hospital, also a law school that is widely known.

São Paulo is the leading manufacturing city of Brazil, and it owes its wealth and progress to the great state of which it is the capital. From this state is shipped more than half the world's supply of coffee. The city has railway connection with Rio de Janeiro, Santos, Buenos Aires and the leading cities

of the surrounding states. São Paulo was founded in 1554, but its present growth did not begin until 1890. Population in 1920, 565,000, 1930, 879,788.

SAP, the juice or fluid which circulates in all plants. Sap is to the plant what blood is to the animal. There are two kinds of sap, namely, *crude sap* and *elaborated sap*. Crude sap consists of the watery fluid taken up by the roots. It contains in solution the plant food taken from the soil. The elaborated sap is formed from the crude sap by the changes it undergoes in the leaves. It is the latter that nourishes the plant.

The circulation of sap is studied most conveniently in a tree. The tree has two kinds of wood, the dark hard wood in the center, known as the *heart wood*, and the light, softer wood under the bark, known as the *sap wood*. The crude sap is taken up by the roots, and it ascends the trunk and branches until it reaches the leaves, where it is changed to elaborated sap. From the leaves the elaborated sap returns to the branches and trunk, which it descends to the roots. It circulates between the bark and the wood, and forms the new layer of wood each year. In some trees this sap has the appearance of mucilage, in others it is more like water. In several species of trees such as the elm, the hemlock and the willow, this sap so loosens the bark in late spring and early summer that the bark can be easily stripped from the tree.

Sugar is made from the sap of beets, sugar cane and the sugar maple. Opium and many other used drugs are made from the sap of plants. The fluid from which rubber is made is not, botanically considered, sap. See PLANT; TREE.

SAPAJOU, sap'a joo, a group of South American monkeys, characterized by their small size, long tails and general intelligence. The monkeys carried around by organ grinders are usually sapajous. The largest species measures forty inches in length, including twenty inches of tail. The best-known species are the *white front*, having a white forehead and light brown fur; the *spider monkeys*, and the *capuchins*, the latter so called because the hair on the head resembles a monk's hood. These monkeys live in trees and feed upon fruit, insects, and sometimes small animals. See MONKEY.

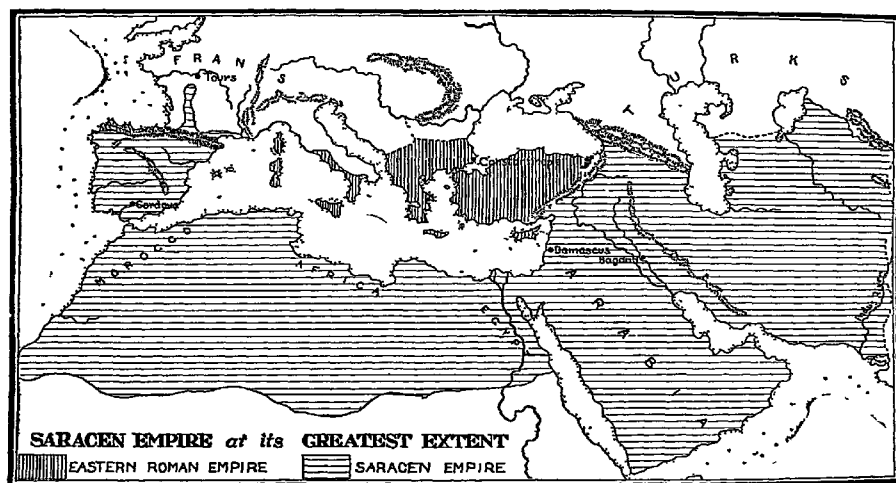
SAPPHIRE, saf'ire, a transparent, blue stone, next in hardness to the diamond, belonging to the corundum class. Sapphires

are found in Burma, India and Ceylon, in Asia; Bohemia and Silesia, in Europe; and in the United States, chiefly in Montana. Sapphires vary from pale blue to deep indigo, but the most valuable are of cornflower tint. The sapphire is the birthstone for September.

SAPPHO, *saf'o*, a celebrated Greek poetess, born probably in the seventh century B. C., at Mitylene, on the island of Lesbos. Little is known regarding her life, but she has been made the subject of many legends. At Mitylene, Sappho appears to have been the center of a group of maidens whom she instructed in the art of song. Her odes, elegies and epigrams, of which only fragments have come

characters of the Old Testament, the wife of Abraham and the mother of Isaac. She was the steadfast helpmeet of her husband in all his wanderings; her greatest grief was that she was childless. When she was ninety, Isaac was born. After she was a mother, she became jealous of Hagar, her personal servant, who was Abraham's concubine, and she caused Hagar and her son Ishmael to be driven away (*Gen. xxi, 10-14*). Sara died at the age of 127, and was buried in the Cave of Machpelah; its traditional site is revered.

SARACENS, *sar'a senz*, the name applied by the ancient Greeks and Romans to the inhabitants of Northern Arabia. During the



down to us, display deep feeling and imagination. By the ancients she was known as the "Lesbian nightingale."

SAP'SUCKER, a group of birds belonging to the woodpecker family, given their name because they feed on the sap of trees, which they obtain by pecking holes through the bark. There are several varieties, but the *yellow-bellied sapsucker* is the best known. The male has a red head and throat and a black coat with white markings. It is found throughout the northern part of the United States and Canada. The nest is made in holes in trees, and the eggs, seven or eight in number, are white. See **WOODPECKER**.

SARA, also written **SARAH** and **SARAI**, whose name was the origin of all modern designations of Sara, was one of the great

Middle Ages, the name was applied to all Mohammedans and to the Arab Moors who in the eighth century set up a kingdom in Spain, and attempted to overrun Europe. Their plan was frustrated by Charles Martel at the Battle of Tours, where the Saracens suffered a disastrous defeat.

SARAGOSSA, *sah ra goh's sa*, SPAIN, capital of Saragossa province and an important commercial city, is situated on the Ebro River, 112 miles northeast of Madrid and on the site of an ancient Iberian town. The center of the city is characterized by narrow, crooked streets and old, dilapidated buildings. Around this center has been built a modern city with broad streets and modern buildings. The most important buildings are the cathedral, dating from the twelfth cen-

tury, the archbishop's palace and the Castillo de la Aljaferia, which was at one time the residence of the king of Aragon. There are several higher schools, including a university founded in 1474. The city is an important railroad and industrial center. Its manufactures include foundry and machine shop products, flour, glass, chemicals, soap and candles. Population, 1934, 183,960.

SARAJEVO, *sar' a ya vo*, the capital city of Bosnia, a province of Yugoslavia. The city was the center of worldwide interest in June, 1914, when it was the scene of the assassination of the heir apparent to the Austrian throne. Out of this tragedy came the World War, lasting four years. Sarajevo has a delightful situation in a gardenlike region along the Miljacka River. It is 122 miles southwest of Belgrade, and now has good communications with that city. The Bosnian capital has many modern improvements, as well as picturesque antiquities. Among the institutions is a Roman Catholic seminary. For hundreds of years the town has been a thriving trade center, it now has beet-sugar and metal-ware factories, dyeing and silk weaving plants, potteries and a large brewing establishment. Population, 1931, 78,173. See WORLD WAR; JUGO-SLAVIA.

SARATOGA, BATTLES OF, two engagements near Saratoga Lake, N. Y., which were the turning point in the Revolutionary War. They are also known as the Battle of Freeman's Farm, the Battle of Bemis Heights and the Battle of Stillwater. The British general, Burgoyne, with a force of 10,000 men, had marched from Canada by way of Lake Champlain, expecting to meet the forces of Lord Howe, who was in New York, at Albany, and form a line of military outposts that would separate the New England colonies from the other colonies. At Saratoga Burgoyne met an American army under the command of Arnold, Gates and Schuyler. On September 13, 1777, Burgoyne advanced against the American position on Bemis Heights, but was unable to dislodge the Americans from their position, and it was three weeks before the contest was renewed. On October 7, the British made a second attack on the Americans, and were disastrously defeated. The assistance which Burgoyne expected failed, his supplies were cut off, his forces were completely surrounded by the Americans, and he was forced to surrender October 17. This

victory so advanced the prestige of the American cause in Europe that a treaty of alliance with France was negotiated, and with the assistance of the French, the American cause eventually triumphed. The Battle of Saratoga is regarded as one of the decisive battles of the world. See FIFTEEN DECISIVE BATTLES.

SARATOGA SPRINGS, N. Y., in Saratoga County, thirty-two miles north of Albany, on the Boston & Maine and the Delaware & Hudson railroads, and there is an airport. It has a large number of springs of medicinal quality. In 1910 the state set out to acquire the principal springs here, and within two years had taken over 163, together with the lands around them. Of the springs, all but 19 have been shut off, to control the flow. The village is on the southernmost spur of the Adirondacks, at an elevation of about 320 feet, in a region free from swamps and marshes. There are large hotels, which are said to have accommodated as many as 40,000 guests at one time. A Convention Hall, seating 6,000 people, has made it a favorite place for conventions, and there is a Casino. Saratoga Lake, four miles distant, has been the scene of numerous regattas. The races during August, which attract large crowds, add to the popularity of the resort. The village contains a convention hall, Skidmore College, a business college, a town hall, Saint Faith School, a state armory, a home for orphans and two hospitals. Since 1826 the mineral waters have been shipped to various parts of the world. The principal industries are the bottling of these waters, the making of carbonic acid gas and the manufacturing of foundry products, road-builders' supplies, wall paper, and supplies for druggists and doctors.

Population, 1930, 13,169.

SARATOV, *sah ra tohf*, RUSSIA, capital of a government (province) of the same name, 32,624 square miles in area. The city is 450 miles southeast of Moscow, east of the Ukraine. It is a city of wooden buildings, chiefly, but before the World War was prosperous. It has a university, founded in 1909, schools of theology and drawing, and a museum. Population, 1933, 380,000.

SARCOPHAGUS, *sahr koh' a gus*, a stone coffin. The earliest specimens were found in Egypt and were made of alabaster, limestone, granite or some other durable material. The oldest ones are rectangular in shape and have a flat or curved cover and little orna-

mentation. But the later ones have the shape of the human body and are covered with inscriptions or with carved figures of the kings. The Greeks, Romans and other ancient people made use of stone coffins, and those of the wealthy were ornamented with beautiful designs cut in the stone. Stone coffins are common at the present time among persons of wealth.

SARD, or **SARDOIN**, a variety of chalcidony, which displays on its surface a rich reddish-brown, but when held between the eye and the light appears of a deep blood-red hue. See **CARNELIAN**.

SARDANAPALUS (668-624 B. C.), the name given by the Greeks to the last of the great Assyrian kings, who is generally known in history as **ASSURBANIPAL**. He reigned in Nineveh for forty-two years, and was noted for his interest in literature and art, as well as for his military prowess. He erected magnificent buildings at Nineveh and Babylon, and collected at Nineveh a great library consisting of thousands of clay tablets engraved in cuneiform characters. Many of these tablets are now in the British Museum.

SARDINE, *sahr deer'*, a small fish of the herring family, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain and Portugal. It is much esteemed for its flavor, and large quantities are preserved by being salted and partly dried, then sealed in hot olive oil and finally hermetically sealed in tin boxes, with hot salted oil or with oil and butter. Commercially the name is applied to any small fish put up in oil. On the eastern coast of Maine, young menhaden are canned as sardines, but they are much inferior to the real sardine of Europe. The sardine of the Pacific coast of the United States is a valuable food fish, but it is not canned. It is about a foot long, dark-bluish above and silvery below.

SARDINIA, the second island in size in the Mediterranean Sea, forming a part of the kingdom of Italy. It is 115 miles southwest of Italy, and is separated from Corsica by the Strait of Bonifacio, nine miles wide. Sardinia is 170 miles long, eighty miles wide in the widest place, and has an area of 9,306 square miles, about equal to that of the state of New Hampshire. The interior is mountainous and hilly, and has many rapid streams. The valleys between the mountains are noted for their fertility, and live stock, wheat, olives, grapes, oranges, lemons and

tobacco are raised. About one-fifth of the land is covered by forests.

The chief minerals are lead, zinc, silver and antimony. These, with lignite, granite and salt, constitute the commercial products of the mines. The island has a valuable foreign trade, exporting minerals and agricultural products, and importing such manufactures as are needed by the inhabitants. Politically it is divided into two provinces, Cagliari and Sassari. Cagliari, the capital, had 101,878 inhabitants in 1931; the population of the island then was 973,125. It was formerly a part of the kingdom of Sardinia.

SARDINIA, KINGDOM OF, a former kingdom of the south of Europe, the nucleus of United Italy, composed of the island of Sardinia, the duchy of Savoy, the principality of Piedmont, the county of Nice, the duchy of Genoa and parts of the duchies of Montferrat and Milan. In 1720 Victor Amadeus, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of King of Sardinia. Turin was the capital, and Piedmont, not the island, was the most important part of the kingdom. Amadeus was succeeded by Charles Emmanuel I, Victor Amadeus II and Charles Emmanuel II, the latter of whom, in 1802, abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, on account of the invasion of Italy by Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin. An insurrection brought about his abdication in 1821.

In the next sixty years there were numerous shifts of influence and power. In 1848 Sardinia joined the league which endeavored to drive the Austrians from Italy. The Austrians were finally defeated by united forces of Italy and France in 1859 at Magenta and Solferino. In 1860 the Sardinian Kingdom was merged in the united Italian Kingdom under Victor Emmanuel II. See **VICTOR EMMANUEL II**; **ITALY**, subhead *History*.

SARDONYX, *sahr' doh nks*, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcidony. The name has sometimes been applied to a reddish-yellow or nearly orange variety of chalcidony, resembling carnelian, and also to carnelians, the colors of which are in alternate bands of red and white. It is deemed by many theologians to be the emblem of spiritual strength. See **ONYX**.

SARDOU, *sahr doo'*, VICTORIEN (1831-1908), a French dramatist, born in Paris. He at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *The Students' Inn*, which proved a failure, at the Odeon. However, he continued his efforts and soon attained success in every field of the drama, with the exception of tragedy. His better known works, many of which have been produced on the English stage, are *Our Intimates*, *The Butterfly*, *Daniel Rochat*, *The Benoiton Family*, *Dora* and *Madame Sans Gêne*. His later successes were associated with Madame Bernhardt, for whom he wrote *Fédora*, *Théodora*, *La Tosca* and *The Sorceress*, *Robespierre* was written for Sir Henry Irving.

SARGASSO SEA, *sahr gas'ō*, a large tract of seaweed in the North Atlantic Ocean located between the 25th and 30th parallels, north latitude, and the 38th and 60th meridians, west longitude. The area within which seaweed is found is nearly as large as the state of Texas. Its approximately stationary position is due to the fact that it is hemmed in by the great ocean currents.

So far as known, Columbus first encountered the Sargasso Sea. His sailors were frightened, because they were sure they would founder upon the rocks to which the weeds must be attached, but Columbus proved the great depth of the water. Fantastic stories were given credence everywhere that lost ships had unwittingly been sailed into this becalmed area, had become derelicts, and that the sea bottom was covered with them. The last shred of doubt as to the character of the area was dispelled in 1925 when William Beebe, submarine explorer, spent weeks in this "sea," found no evidence of sunken ships and only occasionally floating masses of vegetable life.

SARGENT, JOHN SINGER (1856-1925), one of the foremost American portrait and genre painters, was born at Florence, Italy, of American parents. He was educated in Italy and Germany. At the age of eighteen he became the pupil of Carolus Duran, who greatly influenced his career. When twenty years old he made his first visit to the United States.

Sargent ranks as one of the greatest portrait artists of his time, and numbered among his sitters Duran, Monet, Edwin Booth, Joseph Jefferson, Ada Rehan, Ellen Terry as

Lady Macbeth, John Hay, and Theodore Roosevelt. *Carmencita*, a dancer in costume, and *Carnation Lily*, *Lily Rose*, two girls lighting Japanese lanterns in a flower garden, are among his most popular pictures; paintings in the Boston Public Library are among the finest of his mural decorations. He has also executed many landscape and figure pieces.

SARNIA, ONT., the county seat of Lambton County, on the Saint Clair River and on the Canadian National and the Pere Marquette railways, sixty-one miles west of London. It is connected with Port Huron, across the river, by ferries and by a railway tunnel about one and one-quarter miles long. The leading industrial establishments include foundries, machine shops, oil refineries, salt works and factories for the manufacture of engines and agricultural implements and woolen goods. Population, 1921, 14,887; 1931, 18,191.

SARPEDON, *sar pé'don*, a hero of the Iliad, was king of the Lycians and ally of the Trojans. He was slain by Patroclus, and his body was rescued and purified by Apollo. According to different accounts, he was either the son of Jupiter and Laodamia or the grandson of another Sarpedon, the son of Jupiter and Europa.

SARSAPARILLA, a drug obtained from the roots of several species of smilax. The plants are tough, twining shrubs, with prickly stems, small flowers and shiny leaves. They are natives of the warm regions of America, being found in South America and on the Mexican Andes. The dry roots of the plant are used in medicine and are odorless and bitterish. Formerly sarsaparilla was considered an efficacious cure in various diseases, but it is now used mostly in spring medicines. Though popularly believed to have a mild tonic effect, physicians and chemists do not consider it valuable as a remedy. It is used to some extent for flavoring soda water.

SARTO, *sahr'toh*, ANDREA DEL (1487-1531), a Florentine master, known for the excellence of his technique as the "Faultless Painter." His real name was ANDREA VANNUCCI, Del Sarto (meaning *the tailor's son*) being a nickname because of his father's trade. Del Sarto studied painting under several Florentine masters, and at the age of thirty already had executed a beautiful series of frescoes in the Church of the Servites and was recognized as one of the best

fresco painters in Florence. Ten scenes from the life of John the Baptist and a *Last Supper* are among his famous frescoes; the most celebrated of his single paintings are the *Madonna del Sacco*, for the Servites, and the *Madonna of the Harpies*, now in the Uffizi Gallery. Other famous paintings include the *Annunciation*, several Holy Families, a number of portraits, and numerous subjects for altar pieces. His oil paintings are found in almost every European art gallery. Del Sarto was the inspiration of one of Browning's famous poems, *Andrea Del Sarto*.



SASKATCHEWAN, *s a s katch'ewahn*, a province of the Dominion of Canada, lying south of the North West Territories and north of the American states of Montana and North Dakota. It touches two other organized Canadian provinces, Alberta on the west and Manitoba on the east.

Saskatchewan was formed in 1905 from parts of the districts of Alberta, Saskatchewan and Assiniboia. Its north and south extent is 760 miles; the northern boundary is 277 miles long, and the southern is 393 miles. The area, 251,700 square miles, is over twice that of New Mexico, and is smaller than that of Manitoba by only 132 square miles. Among the organized Canadian provinces, Saskatchewan ranks sixth in size; Texas is the only American state which exceeds it in area.

People and Cities. In 1921 the population of Saskatchewan was 757,510; in 1931 it was 921,785. The average density per square mile for the province as a whole is over 3.8 but this figure is misleading unless one takes into consideration the fact that the northern part is as yet unsettled. The proportion of town and city dwellers to those who live on farms is about one to two and one-half. About fifty per cent of the inhabitants are of British descent; the remainder are immigrants from the United States and various European countries. Regina is the capital and largest city; other important cities are Saskatoon, Moose Jaw and Prince Albert.

Physical Features. North of the international boundary and extending to the Saskatchewan River there is a rolling prairie

region, diversified occasionally by lakes and patches of woodland. In the eastern part of the region are two ranges of hills, the Beaver and the Touchwood, lying north of the valley of the Qu' Appelle River. This river, the Assiniboine, the Souris and the Saskatchewan drain the southern part of the province. In the north there is a great forest belt of cone-bearing trees; to the south of it, and occupying the central part of the Province, is an attractive region of alternating farm and forest country. The Churehill River, flowing across the central region, drains a chain of beautiful lakes, including Reindeer and Lac la Rouge. Other lakes of importance are Athabaska, in the northwest, Wallaston, in the northeast, Beaver, near the center, and Big Quill, in the south.

Saskatchewan has a healthful, bracing climate. Throughout most of the province the winters are long and cold, but in the southwestern corner the temperature is modified by the warm Chinook winds (see CHINOOK).

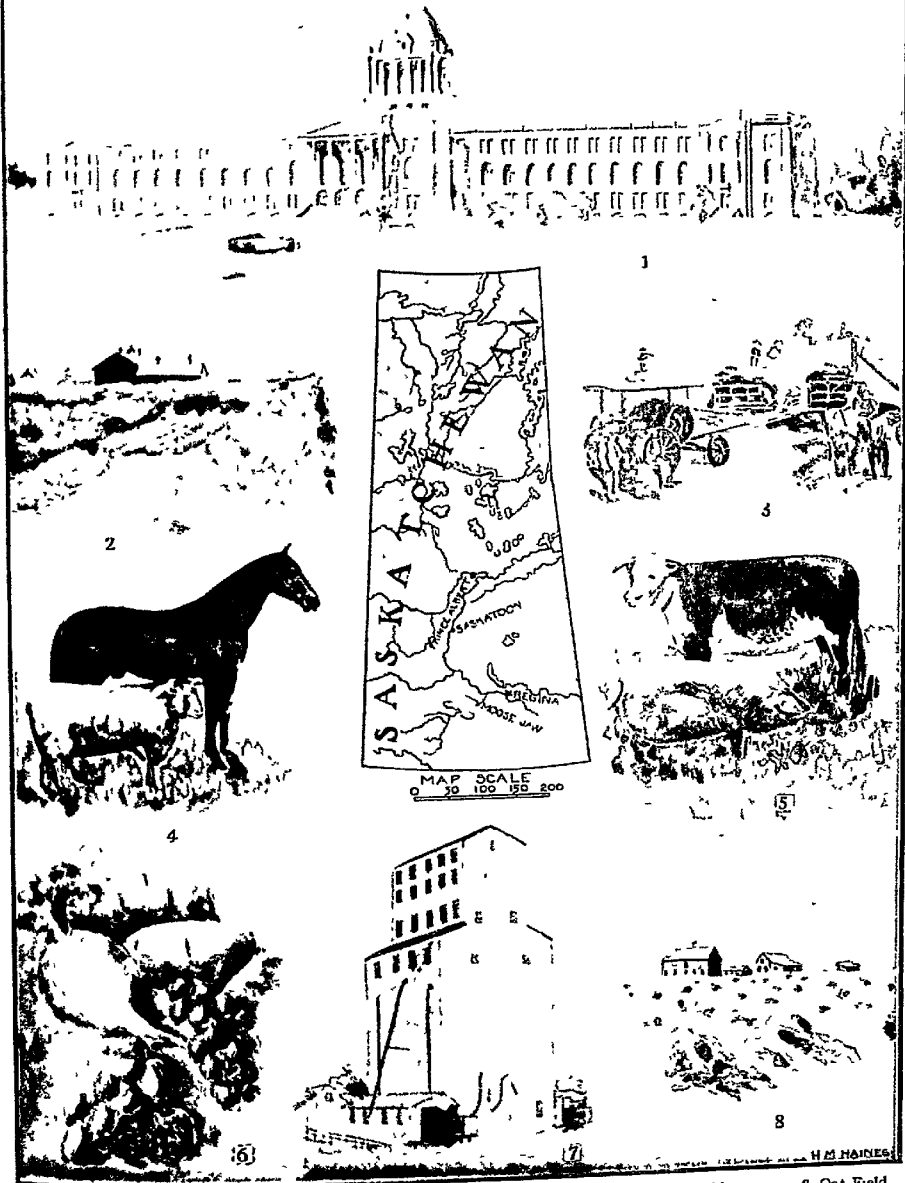
Agriculture. Saskatchewan ranks first among the provinces in the production of wheat, oats and flax, and is second in the production of live stock. Barley and rye are also cultivated, and practically all kinds of garden vegetables are grown. The production of field crops (in bushels) in recent years is shown in the following table, the figures being official estimates:

Wheat	224,000,000
Oats	126,000,000
Barley	27,000,000
Flax	2,500,000
Rye	3,600,000

There are about 496,000 dairy cows in the province, and the dairy industry is in a prosperous condition. This industry is centered chiefly in the parklike region between the Saskatchewan and Churchill rivers. Creamery butter is produced in sufficient quantity for export, the annual output exceeding 16,000,000 pounds. Cheese making is also developing rapidly. Horses, sheep and swine are raised in large numbers, and the poultry industry is receiving general attention. At Saskatoon there is a college of agriculture which gives scientific aid to all branches of farming.

Other Industries. The manufacture of lumber products, brick making and flour milling are the chief branches of manufacturing, but manufacturing industries have not

SASKATCHEWAN



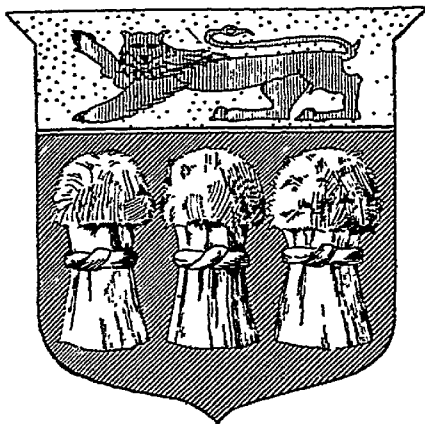
1, Parliament Building at Regina
2, Experimental Farm at Indian Head

3, Thrashing Scene
4-5, Live Stock

6, Fruits and Vegetables
7, Grain Elevator

8, Oat Field

as yet developed very extensively. The larger towns support a large variety of industrial plants which supply the local demand. Prince Albert is the center of the provincial lumber industry, and Saskatoon has one of



COAT OF ARMS OF SASKATCHEWAN

The British lion, on a gold background, symbolizes the unity of the province with the British Empire. The three stacks of golden wheat, on a green background, represent Saskatchewan's position as the premier wheat province of the Dominion.

the largest flour mills in the Dominion. Both Saskatoon and Regina are important distributing centers, and the latter city has the largest trade in agricultural implements of all the Canadian cities. The province is surpassed in mineral production by all of the other organized provinces, yet the value of its annual output averages over \$2,000,000. Clay suitable for making bricks occurs in many localities, and at Estevan, in the extreme southeast, the clay deposit rests on lignite coal. Estevan is the chief center of coal mining, but other deposits have been discovered west of Saskatoon. Other minerals of importance include gold, silver, petroleum and natural gas.

Transportation. Saskatchewan is traversed from east to west by two great trunk lines—the Canadian Pacific and the Canadian National railways. All of these roads have numerous branches and feeders, and the province as a whole has a railroad mileage of over 6,200. The chief railway centers are Regina and Moose Jaw, in the south, and Saskatoon and Battleford. The latter is in the northern part of the settled portion of the province.

Items of Interest on Saskatchewan

"Saskatchewan" is a Cree Indian word meaning *rapid-flowing river*.

About \$250,000 worth of fish are taken from the lakes of the province each year, whitefish being the most important.

The country north and east of Prince Albert is heavily timbered with tamarack, spruce and jack pine. There are about 9,680 square miles of forest reserves in the province under the Dominion government.

Nearly 13,000 Indians, chiefly Crees, live on government reservations.

In Saskatchewan there is a colony of Dukhobors, a religious denomination whose members refuse to perform military service.

The province enacted a prohibition law during the World War, but has since adopted government control.

Questions on Saskatchewan

What is the area of Saskatchewan? Compare it with that of Great Britain and with that of New Brunswick.

Describe the surface of the province.

Name the principal rivers.

Compare the wheat crop of Saskatchewan with that of the other provinces.

How does Saskatchewan rank as a producer of oats?

What other crops are of importance?

Where is coal found in Saskatchewan?

What are the principal manufactures?

Where is the provincial university located?

Describe briefly the school system of the province.

What is the total railway mileage?

How many representatives has the province in the House of Commons?

What are the principal cities?

What was the population in 1911?

What would be the population of Saskatchewan if it were as thickly settled as New Brunswick?

What is the extreme length and width of the province?

What is the capital city?

Education. Children are compelled by law to attend the free public schools, which are under the direction of a minister of education. The University of Saskatchewan at Saskatoon is at the head of the school system; normal schools at Regina and Saskatoon are also maintained by the provincial government. The school district is the unit for public education, and the affairs of each district are managed by a local board. There are several colleges in the province under denominational control.

Government. The chief executive officer is the lieutenant-governor, who is appointed by the Governor-General of the Dominion. An executive council, or cabinet, of eight members, at the head of which is the premier, assists the lieutenant-governor, whose term of office is five years. The legislative power is vested in an assembly of sixty-two members. Saskatchewan sends twenty-one members to the Dominion House of Commons. There is a provincial judiciary composed of a supreme court and district courts. Women enjoy municipal and provincial suffrage.

History. Saskatchewan was organized in 1905 from various districts included in the old North West Territories. Its history as an organized province has been mainly one of peaceful development and prosperity, and it was a loyal supporter of the mother country throughout the World War.

Related Articles. Consult the following titles for additional information:

Assiniboine (river)	North West Territories
Athabaska Lake	Prince Albert
Battleford	Red River Rebellion
Canada (history)	Riel, Louis
Churchill River	Saskatchewan Rebel-
Hudson's Bay	lion
Company	Saskatchewan River
Moose Jaw	Saskatoon

SASKATCHEWAN REBELLION, an uprising of the half-breeds in the Canadian Northwest in 1885, under the leadership of Louis Riel (see **RIEL, LOUIS**). For the causes leading to this outbreak, see **RED RIVER REBELLION**. After the Red River Rebellion the *Metis*, or half-breeds, were pacified by being given 248 acres of land each, but as settlers poured into Manitoba, a large number of the *Metis* moved into Saskatchewan, where they were again disturbed by settlers, and especially by the building of the Canadian Pacific Railway. They found that the herds of buffalo, upon which they depended for their meat, would be exterminated, and feared that they would lose their lands, since they had no titles to them. In 1884 they

sent for Riel, who since the Red River Rebellion had been living in the United States, to return and help them maintain their rights. In March, 1885, a provisional government was organized at Saint Laurent, and Riel was chosen president.

Probably the difficulty would have been adjusted without resort to arms had not an encounter taken place at Duck Lake, between some of the Mounted Police and the half-breeds. This was followed by an uprising of the Cree Indians who attacked the settlement at Frog Lake, killed the men and carried away the women and children. The Canadian government at once sent forces under General Middleton to quell the disturbance. The insurgents were defeated at all points. The Cree chiefs surrendered; Riel was taken prisoner, tried and hanged for treason. Since then there has been no trouble.

SASKATCHEWAN RIVER, a river of Canada, which with the Nelson forms the greatest river system entering Hudson Bay, and one of the four great river systems east of the continental divide. The Saskatchewan is formed by two branches often known as the North Saskatchewan and the South Saskatchewan. The north branch rises in the Rocky Mountains, in the west part of Alberta, and the south branch, which is often known in the upper part of its course as the Bow River, rises in the vicinity of Devil's Lake, in western Alberta. After winding courses of 800 to 900 miles, these streams unite in the province of Saskatchewan, and the united stream flows eastward into Lake Winnipeg. From this lake it is generally known as the Nelson (see **NELSON RIVER**). The length of the united Saskatchewan is about 300 miles, making the entire length from the source of the Bow to the mouth 1200 miles. The area of the drainage basin of the Saskatchewan-Nelson system is 370,800 square miles, or about one-tenth the area of the Dominion of Canada. Below Cedar Lake, through which the river flows, navigation is interrupted by rapids, but west of the lake it is navigable for steamers to the junction of the two branches, and smaller boats ascend the stream as far as Edmonton 500 miles farther.

SASKATOON, SASK., the sixteenth city in Canada in size, is located on the Saskatchewan River, and on the Canadian Pacific and the Canadian National railways, 466 miles west of Winnipeg and 335 miles east

of Edmonton. Branches of these roads radiate from Saskatoon in all directions, making the city one of the most important railway centers in Western Canada, it controls a business territory of nearly 50,000 square miles. Many large firms of Canada and the United States have established factories and warehouses here. The wholesale trade is conducted by 200 firms and includes the distribution of groceries, provisions, hardware, lumber and agricultural implements. There are many factories, making breakfast foods, flour, stoves, tractors and clothing. The city has branches of the principal banks, a Dominion lands office and a law titles office, and a collegiate institute. The university of Saskatchewan and the agricultural college and experimental farm of the province are located here. Population, 1931, 43,291.

SAS/SAFRAS, a tree belonging to the laurel family, widely known for its medicinal properties. In the northern part of the United States it is a shrub or small tree, but in the South it grows to the height of forty-five feet. Its range is from Southern Vermont to Florida. The leaves are oval, two-lobed and three-lobed; the three forms often appearing on the same branch. In the autumn the foliage turns to scarlet and deep yellow. From the bark an aromatic oil is obtained, and the bark itself is steeped to make "sassafras tea," popularly believed to be a blood purifier. The taste of sassafras is bitter and aromatic, and it is sometimes used for flavoring.

SATELLITE, a small planet revolving around a larger one, as the moon revolves around the earth. So far as known there are twenty-nine satellites in the solar systems, distributed as follows: Earth, one; Mars, two; Jupiter, nine; Saturn, ten, and three rings; Uranus, six; Neptune, one. Like planets, satellites shine with light from the sun.

SATIN, a soft, closely woven silk, with a glossy surface. In the manufacture of satin, part of the weft is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks. It is of Chinese origin, but is now made extensively in Europe, Great Britain and the United States. Satin is the term applied to silk material, *sateen*, to woolen, linen and cotton imitations. As in silk, tin is sometimes used as an adulterant.

SATIRE, the name given a poem in which people and events are ridiculed. It originated with the Roman writer Lucilius, and it was developed by Horace and Juvenal. Satire may also take the form of epistles, tales, dialogues, songs or fables. Swift's *Gulliver's Travels* is one of the greatest satires ever written. Among English poems, Dryden's *Absalom and Achitophel* and Pope's *Dunciad* are the most celebrated. Lowell's *Biglow Papers*, a series of poems, is the most noted satire in American literature.

SATURDAY, the seventh day of the week, named for the Roman deity Saturn. Saturday is the Sabbath of the Jews and of the Seventh Day Adventists.

SATURN, in classical mythology, an early god, the husband of Rhea and father of Jupiter, Neptune, Pluto, Juno, Vesta and Ceres. He deposed his own father, Uranus, and ruled in his stead. Fearing a prophecy that he in his turn would be dethroned by his son, he swallowed his children as soon as they were born. Jupiter alone was saved, by a stratagem of his mother, who compelled Saturn to disgorge the children whom he had swallowed. Later Jupiter dethroned Saturn, who then withdrew to Italy, where he founded a prosperous kingdom, and his reign was known as the Golden Age. In art Saturn is represented as Father Time.

SATURN, a planet of the solar system, in position sixth from the sun, which is about 886,000,000 miles distant from it. It is about 70,000 miles in diameter, being second in size to Jupiter. The surface area is about ninety times that of the earth, but Saturn is only about one-eighth as dense as our planet. It rotates upon its axis in about ten hours, and makes a revolution around the sun in twenty-nine and a half earth years. The planet is surrounded by a system of flat rings composed of meteoric particles that produce a gauzy effect resembling dust in a ray of sunlight. The band of concentric rings is about 10,000 miles wide and 100 miles thick. The diameter of the outer ring is about 173,000 miles. Saturn has also ten satellites, the largest of which is Titan, about 3,000 or 4,000 miles in diameter. Seen with the unaided eye, Saturn is a bright star, with a slightly reddish tint. Like Jupiter, it is a gaseous body, surrounded by a very dense atmosphere. It is best seen in late summer and early autumn in the eastern or southeastern sky, moving south as the evening advances.

SATURNALIA, a festival held by the Romans in honor of Saturn, during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It lasted under the Caesars, seven days, namely, from the seventeenth to the twenty-third of December. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday and slaves were free from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters and their guests. The last days of the festival were spent in visiting and giving presents. Little clay images called *sigillaria* were the principal gifts.

SATYRS, *sat'ers*, in Greek mythology, a class of woodland divinities, at later times inseparably connected with the worship of Bacchus. The satyr appears in works of art as half man and half goat, having horns on the head and a hairy body, with the feet and tail of a goat. Satyrs are described as being fond of wine and of every kind of sensual gratification. Pan was the chief of the satyrs.

Related Articles. Consult the following titles for additional information:

Fauns Pan
Mythology Silenus

SAUDI ARABIA. See ARABIA.

SAUL, the first king of Israel, who reigned from about 1095 to 1056 B. C. He was inducted into his office by Samuel, the last judge of Israel. During his reign he united the tribes and gained several victories over the Philistines, Edomites and other hostile nations. He was self-willed, and the last years of his reign were clouded by a quarrel with David, of whom he became insanely jealous. His history is told in *1 Samuel*. See, also, **BIBLE**, subhead *Bible Stories*.

SAULT SAINTE MARIE, *soo saint ma re'*, or (French) *so saNt ma re'*, Ont., on the Saint Mary's River and on the Canadian Pacific, the Algoma Central and the Hudson Bay railroads. There is steamship connection with all lake ports, through the great Sault Sainte Marie Canal (which see). The place is connected with Sault Sainte Marie, Mich., on the opposite side of the river, by a railway bridge one mile long. The town has large power plants, important ore and paper mills, foundries and other manufacturing. In the neighborhood are mines of iron, copper and silver, and there is a flourishing lumber industry. In 1917 the city

annexed Steelton. A new power canal which cost \$1,000,000, developing 28,000 horse power, was completed in 1918. Population, 1921, 21,092; 1931, 23,082.

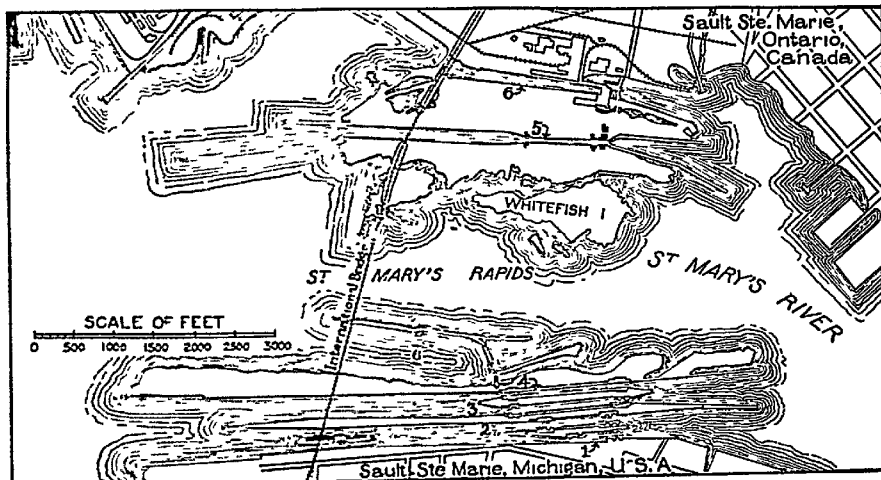
SAULT SAINTE MARIE, *MICH.*, popularly called "the Soo," the county seat of Chippewa County, 350 miles nearly north of Detroit, on Saint Mary's River and on the Duluth, South Shore & Atlantic, the Canadian Pacific and the Minneapolis, Saint Paul & Sault Ste. Marie railroads, and on the Sault Sainte Marie Canal (which see), connecting Lake Superior with Lake Huron. The largest inland commerce in the world passes through the canal. The falls in the river have been utilized in the development of very extensive electrical power. Connection with the Canadian city of the same name is by a great bridge a mile long. The industrial establishments are fish-packing houses, lumber mills, leather, carbide and woolen mills, and other factories. The city has a Carnegie Library, a hospital, a Federal building, and an airport. The first permanent settlement within the present state of Michigan was made here by Father Marquette in 1662. Population, 1920, 12,096; in 1930, 13,755.

SAULT SAINTE MARIE CANAL, also called **SAINT MARY'S CANAL**, the canal around the rapids in the Saint Mary's River at the outlet of Lake Superior. There are really five canals—one on the Canadian side and four on the American side of the river. Measured by the traffic, the Sault Sainte Marie is the most important canal in the world. It has a length of one and one-half miles and a drop of eighteen feet.

The first canal was built by the state of Michigan in 1855, and was reconstructed by the United States in 1881. This was the first of the modern locks, and is known as the Weitzel lock; it is 515 feet long, eighty feet wide, and has seventeen feet of water on its mitre sills. The Poe lock, completed in 1896, is 800 feet long, 100 feet wide, and has twenty-two feet of water on its sills. At the time of its completion, this was the largest lock in the world. Meanwhile, the Canadian government completed a lock on the north side of the river, 900 feet long, 150 feet wide and twenty-three feet deep. But the increase in lake traffic called for still greater canal facilities, and in 1908 the United States ordered the construction of the Davis lock, north of the Poe lock. This was com-

pleted in 1914; it is 1,350 feet long, eighty feet wide and twenty-four and one-fourth feet deep. In 1912, while the Davis lock was under construction, Congress ordered another lock of the same size and parallel to it. This fourth lock was completed in 1918.

SAUSAGE, *saw'sayj*, a food consisting of finely-chopped meat mixed with potato flour and seasoned with salt and spices. Sausage of the packing houses is made chiefly of trimmings, particularly those of the head and hoof, and its manufacture is one of the most



SAINT MARY'S FALLS CANAL

1 Weltzel Lock
2 Poe Lock

3 Davis Lock
4 Sabin Lock

5 Canadian Lock
6 Power Canals

These locks can accommodate two of the largest lake steamers at once, and can be filled or emptied in six minutes. During the season of navigation there is scarcely an interval of ten minutes, day or night, when there are not boats in one or more of these canals. During one single season, a period of 237 days, 19,569 steamships, 1,943 sailing vessels and 1,373 unregistered vessels passed through the canal. This total has frequently been exceeded, for more than 21,000 vessels have passed through in a year. In the best year on record 92,622,000 tons of freight were borne through the canal. See CANAL.

SAUNDERS, MARGARET MARSHALL (1861—), author, was born at Milton, Nova Scotia. Miss Saunders has traveled extensively and takes an active part in philanthropic work. Her best known book is *Beautiful Joe*, which has been translated into many foreign languages. Among her other books for children are *Charles and his Lamb*, *Tilda Jane*, *Beautiful Joe's Paradise*, *Nita*, *The Story of an Eskimo Dog*, *Princess Sukey* and *My Pets*. Her stories are remarkable for their sympathetic treatment of dumb animals.

profitable branches of meat-packing. The work is all done by machinery. After the meat is chopped it is mixed with an equal part of potato flour, and enough water is added to allow the mixture to be easily worked. Sage, pepper, ginger and mustard are the spices generally used. Salt is added to suit the taste, and most of the sausage is packed in casings made of the intestines of the slaughtered animals. As the casings are filled, they are divided into links, hence the name "link sausage." Home-made sausage is made wholly of meat.

There are numerous varieties of sausage, the difference between them consisting chiefly in the seasoning and the manner of packing. But in some varieties, such as Bologna, smoked meat is used. Among Europeans the Bologna sausage of Italy and the smoked sausage of Germany are highly esteemed. Besides these varieties, Frankfurts and wienerwursts are common in American markets.

SAVANNAH, GA., the county seat of Chatham County, on the Savannah River, fourteen miles from the ocean, 260 miles

southeast of Atlanta and 768 miles by steamer from New York City. It is on the Southern, the Atlantic Coast Line, the Seaboard Air Line, the Central of Georgia, and the Savannah & Atlantic railroads. There is an airport. It has sometimes been called "the Forest City," from its ornamental shrubbery and luxuriant shade trees, according to government statistics Savannah has more park space than any other city in the United States, in proportion to size. There is a statue to Confederate dead in the Parade Ground, an extension of Forsyth Park, a beautiful pleasure ground.

The city has free kindergartens, several private schools and colleges, public libraries for white and colored people, including a Carnegie Library, and Telfair Art Gallery. There are numerous charitable institutions, including the Savannah and the Saint Joseph's hospitals, the Georgia infirmary for colored people, the Episcopal orphans' home, Oglethorpe Sanitarium and Telfair Hospital for women. There are many churches, some in the old colonial style of architecture. On the site of Christ Church, John Wesley founded the first Sunday school in America. Other prominent buildings are a courthouse; a Federal building; a union passenger station; Hodgson Hall, containing the library and collection of the Georgia Historical Society; and numerous business buildings ranging from eight to fifteen stories.

The surrounding country produces rice, cotton, sugar cane, vegetables and fruits, and truck gardening is very extensively carried on near the city. The manufacturing industry is of recent development, but of very rapid growth. The products now include fertilizers, lumber and its products, car wheels, shirts and overalls, tin cans, cottonseed oil, crates and boxes, candy, brooms, baking powder, cigars, ice, sash and blinds. The city has a very large trade, both coastwise and foreign, and exports cotton, rosin, spirits of turpentine, lumber and timber, phosphate rock, fruits, vegetables and various manufactured goods. There are excellent terminal facilities for freight handling.

Savannah was settled in 1733 by a small company under the leadership of Gen. James Edward Oglethorpe. During the Revolution the town was fortified by the Americans, but was captured by the British in 1778 and held until the end of the war. It was chartered as a city in 1789. The first steamship which

crossed the Atlantic set sail from here, was owned by Savannah people and was called the *Savannah*. At the time of the Civil War the city had about 25,000 people. It was the end of General Sherman's famous march to the sea and was surrendered after a brief defense and the destruction of the navy yard (Dec. 21, 1864). Since 1900 the boundaries of the city have been extended, bringing within the city limits several suburbs. Population, 1920, 83,252; in 1930, 85,024, a gain of 2 per cent.

SAVANNAH RIVER, a river 550 miles in length, formed in South Carolina by the union of the Tugaloo and the Kiowee. It flows in a southeast direction into the Atlantic Ocean, forming a part of the boundary between Georgia and South Carolina. It is navigable for large steamers as far as Savannah and for smaller steamers to Augusta, about 230 miles, while the smallest crafts ascend for 150 miles farther inland.



SAVINGS BANKS, institutions organized for the accumulation and use of small sums of money. They originated about the middle of the eighteenth century, though they had been suggested at an earlier date. The first bank of the kind was established at Brunswick, Germany, in 1765. The chief purpose of such institutions was originally, and has continued to be, the providing of facilities for the safe keeping of small savings, which the larger banks could not profitably handle.

The first savings bank established in the United States was the Philadelphia Saving Fund Society, which was founded in 1816 and chartered in 1819. Deposits up to \$5,000 have been insured since 1933.

There are two classes of savings banks in the United States. These are *mutual* banks, which are owned by the depositors, and *stock* banks, owned by the stockholders. The minimum rate of interest and the nature of the investments which both classes are allowed to make are regulated by state laws. While these two classes of savings banks have more than 14,000,000 depositors and care for over \$13,000,000,000, the greater part of the savings funds are cared for by the savings departments of the regular banks.

Postal Savings Banks. The first postal savings banks were established in England in 1861. Other European countries soon followed England's example, but in the United States such banks were not established until 1910.

Anyone ten years of age or over can open an account in a postal savings bank in his or her own name on depositing one dollar, or any multiple of that sum, provided that not more than \$100 be deposited by the same person within one month. Those who wish to begin saving with sums less than one dollar have the privilege of purchasing special savings bank stamps at ten cents each. The first purchase is a ten-cent card, and to this the stamps are attached until their value reaches one dollar, when the card may be canceled and an account be opened. Funds may be withdrawn at any time. Interest is computed only on even years and on even dollars. No depositor can have over \$1,000 to his credit. When his deposits reach this amount, he can convert his deposit into government bonds paying the same rate of interest, if he so desires, and at any time, by notifying the secretary of the treasury, a depositor can convert his funds into such bonds in sums as low as \$20. Since the establishing of these banks millions of dollars before hidden away for safe keeping have been deposited with the government, and have found their way into the channels of trade. During periods of financial depression, as in the early months of 1933, when people lost their confidence in the banking institutions, the postal savings bank proved a secure haven for deposit of accumulated savings. The full credit of the government was behind the system. The total amount of deposits in postal savings bank has varied from \$65,000,000 to \$1,198,000,000.

School Savings Banks. School savings banks have been in existence in Europe for more than a century. They were established in the United States in 1835. The customary plan is for the school to receive the savings of the pupils and place the total sum in a savings bank. When a pupil's savings amount to one dollar an individual account is opened for him. Money cannot be withdrawn except with the written consent of the parent or guardian. Millions of dollars have been saved by pupils in the public schools since the opening of these banks. Deposits have reached as high as \$28,672,000.

SAVINGS BANKS, CANADIAN Since Confederation the Canadian government has conducted three kinds of savings banks. The first of these, known as the Dominion government savings bank, was established by the Maritime Provinces and was assumed by the Dominion after Confederation. As far as possible the accounts in these banks have been transferred to the postoffice savings banks. This postal savings system is nothing more or less than a national savings bank conducted by the postoffice department. Money is deposited just as in any bank and interest at three per cent is paid on deposits. Any person may have a deposit account—the accounts of children, however, are protected by special regulations. The total deposits made by an individual in each fiscal year (ending June 30) may not exceed \$1,500 and the total balance, exclusive of interest, to the credit of any account is limited to \$5,000.

A depositor in any of the savings bank postoffices may continue his deposits at any other such offices and he may withdraw money at that office which is most convenient to him. For instance, if he makes his first deposit at the savings bank at Regina, he may make further deposits at, or withdraw his money through, the postoffice at Banff, Winnipeg or any place that may be convenient to him, whether he still lives at Regina or has removed elsewhere.

The second class are the savings departments of the chartered banks of Canada, conducted at their many branches.

There is a third class of government savings bank, this is known as the "school savings" or "penny savings" bank. The Penny Bank of Toronto, now known as the Penny Bank of Ontario, was the first one to be founded. It has a charter from the Dominion government, granting the right to receive school savings from any part of the Dominion. These savings, according to statute, must be deposited with the government.

SAVONAROLA, *sav o na ro'la*, GIROLAMO (1452-1498), a noted Italian reformer, was born at Ferrara. At an early age he joined the Dominican Order and entered their convent at Bologna, where he became professor of philosophy and theology. He began preaching in 1482 at Ferrara, but soon went to Florence, where, in 1491, he was elected prior of Saint Mark's. Having persuaded himself that he was prophetically inspired, he assumed to foretell impending calamities. He

was intensely enthusiastic and earnest in his efforts to reform the very lax morals of the period.

Feeling that the Church required purification, he fearlessly assailed Alexander VII, who was then pontiff. In 1494, when Charles VIII invaded Italy, Savonarola went to him and by the religious fervor of his appeal had Florence spared from invasion. He took a prominent part in framing the constitution of the Florentine Republic and opposed the pretensions of the Medici



SAVONAROLA

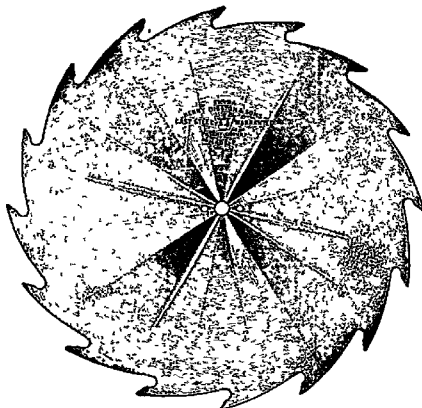
to regain the dominion of Florence, proclaiming death for those who conspired against the Republic. The Medici had strong influence at the Vatican, and used it against Savonarola. Although he continued his clerical duties for a time, he soon lost his hold upon the people of Florence. On April 9, 1498, he and two of his associates were thrown into prison. Six weeks after their arrest they were executed. In the interval between his condemnation and death, Savonarola devoted himself to prayerful preparation. Savonarola's writings consisted of sermons, theological works and a treatise on the government of Florence.

SAVOY, House of, the oldest reigning European dynasty, now the ruling house of the kingdom of Italy. Its members are descendants of Humbert, first Count of Savoy, who lived between 1003 and 1056. Since 1416 they have been dukes of Savoy, kings of Sardinia since 1720, and kings of Italy since 1861. For history of the dynasty, see **ITALY**, subhead *History*.

SAW, a tool made of a thin band or disk of steel, and used in cutting wood, stone, ivory and metals. One edge of the saw is cut into teeth. The shape of the teeth divides saws into two classes, crosscut and rip, and each class has many sizes and shapes. The *crosscut saw* has teeth for cutting across the fiber of the wood. They are triangular and are sharpened on both sides, coming to a sharp point. The *rip saw* is designed for cutting lengthwise the fiber, and the teeth have one edge vertical to the edge of the saw and the other slanting. They are sharpened

so as to have an edge like a chisel. In all saws, the points of the teeth are bent slightly outward so that the portion of wood, or *kerf*, cut by the saw will be a little wider than the thickness of the blade.

Circular saws are found in sawmills, where they cut most of the lumber prepared for market, and in wood-working factories. Some of these saws in lumber mills are seven feet in diameter. They are operated by water, steam or electric power, and will cut 200 feet of wood, board measure, per minute. A *band saw* consists of a band of steel with teeth on one edge, and stretched over two pulleys like a belt. Band saws are used for cutting barrel staves and thin parts of furniture. *Gang saws* are straight saws set in a frame that has an up and down motion. They are used in large sawmills. The distance between the saws is equal to the thickness of the lumber desired. One of these gangs will saw an entire log into boards



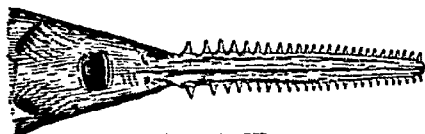
A CIRCULAR SAW

Rip saw used in a machine saw.

in the time that a single upright saw would cut one board. The crosscut saw is a thin band of steel with a handle at each end for the workmen to grasp. It is used in felling trees and sawing logs. *Meat saws* have a thin, narrow blade fastened to an iron frame; the teeth are fine. Saws for cutting metal are of a similar design. The blades are tempered so that they are very hard.

SAWFISH, a fish of the ray family whose chief characteristic is the possession of long swordlike snout, with spines projecting like teeth on both edges, forming the "saw." It

is a large fish, and specimens taken off the Atlantic coast of the United States have measured fifteen feet in length. The saw is some-



SAW FISH

Under surface of head of fish

times six or seven feet long and a foot wide at the base. It is a powerful weapon and the fish uses it to tear open the bodies of its victims. The mouth on the under surface of the head has rough, flat teeth, used for crushing the food.

SAW FLY, a large family of insects, so called because the female is armed with a number of sawlike organs with which she perforates the stalks and other parts of plants for depositing her eggs. The fluid injected into the perforation causes a gall-like swelling, where the larva lives. Different species infest different plants, and the larvae are destructive in different ways; though they may practically disappear for several years at a time, they again become very numerous and do much damage to wheat, turnips, currants and other crops.

SAXE, *sax*, JOHN GODFREY (1816-1887), an American humorous poet, journalist and lecturer, born at Highgate, Vt. He practiced law for a time, but abandoned this for a literary career. His claim to fame rests upon his humorous poems included in *Progress*, a satirical poem; *The Money King*; *The Flying Dutchman*; *Fables and Legends of Many Countries* and *Leisure-Day Rhymes*.

SAXIFRAGE, the popular name of a genus of plants, many of which grow in stony soil. All species are inhabitants of highland regions of the cold and temperate parts of the northern hemisphere. Most of them have tufted foliage and panicles of white, yellow or red flowers, and many are well known as ornamental plants in gardens. The best known species are the *beefsteak*, or *strawberry geranium*, imported from China; the *golden saxifrage*, and the *swamp saxifrage*.

SAX'ONS, a warlike Germanic people who in the fifth and sixth centuries invaded Britain and laid the foundation for the Saxon kingdom in the island. A part of the people remained on the continent, where they had

spread over what is now Northwestern Germany as far as the Elbe. They were conquered by Charlemagne, who forced them to embrace Christianity. The German state, Saxony, takes its name from the Saxons who originally inhabited that part of Europe.

SAX'ONY, a kingdom of the former German Empire, whose ruler, Friedrich August II, abdicated in November, 1918, at the time of the revolution which overthrew the imperial German government. Thereupon a democratic government was established in Saxony, which became one of the states of the German republic. In 1933 the states as such were abolished, and Saxony, with other states, became merely an administrative unit in the unified nation, under Berlin authority. Saxony is situated in the eastern part of Germany. The area is 5,789 square miles, and the population was 5,196,652 in 1933. Leipzig, Dresden, Chemnitz and Plauen are the chief cities.

The state is traversed by the Elbe River, and has several ranges of mountains with rich mines of silver, iron, coal and other minerals. About one-fourth of the country is covered with forests. Abundant crops of potatoes and cereals are harvested, and the state is also a prosperous manufacturing region. At Meissen is a state porcelain factory which produces the famous Dresden china; Leipzig is a world center of printing and publishing.

History. The name Saxony was originally given to the country in which the Saxons dwelt. These people were conquered by the Franks in 785 and were completely subjugated within the next twenty years. Later the Saxons and most of their country were incorporated into the empire of Charles the Great. Owing to the attacks by Slavs and Northmen the people organized the country into divisions called *marks*, for the purpose of mutual protection. These were governed by dukes, one of whom, with his descendants, extended his power over the entire region known as Saxony and thus formed the old Saxony duchy. In 919 Henry, the ruler of this duchy, was elected king of Germany and his family ruled the country until 1024. During the Middle Ages the kingdom formed various alliances and was ruled by a number of different families.

At the breaking out of the Reformation the country was ruled by Frederick the Wise, who was an intimate friend of Luther and

who used his influence to establish Protestantism in Saxony and other German countries. In this he was measurably successful, and his son and successor continued the work and finally secured the triumph of Protestantism in Germany; but during the Thirty Years' War Saxony lost its position as the leading Protestant German state. Late in the seventeenth century Frederick Augustus, who was at that time emperor, also became king of Poland and joined Peter the Great and the king of Denmark in an attempt to overthrow the government of Sweden. The failure of this attempt was disastrous to Saxony and left the country nearly bankrupt.

In 1735 Saxony became involved in the War of the Austrian Succession, from which it did not escape without financial disaster. In 1806 the ruler, Frederick Augustus I, became an ally of Napoleon, who in the following year conferred upon him the duchy of Warsaw, but after the overthrow of Napoleon at Leipzig Augustus was deprived of more than half of his kingdom, which was awarded by the Congress of Vienna to Prussia. In 1866 Saxony joined Austria in the Seven Weeks' War and as a result was compelled to become a member of the North German Confederation; in 1871 it became a member of the German Empire. See GERMANY; WORLD WAR.

SAXOPHONE, *sak'ə fohn*, a brass musical instrument invented by Adolph Sax, from whom it takes its name. The saxophone has a deep tone and is used principally in military bands. It consists of a conical tube turned upward at the bottom, and having a small part turned backward at the top. The mouthpiece contains a reed similar to that used in a clarinet. There are twenty keys arranged on the tube, which are played by the first three fingers of each hand.

SCAB, or **SCABIES**, *skə'be eez*. See MANGE.

SCALE, in music a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees, counted upward in a regular order from a base note (the tonic or keynote), to which series the eighth is added to form the octave. The scale having C for its keynote is the natural, or normal, scale. The *diatonic scale* ascends by five steps (tones) and two half steps (semi-tones), taking for

the names of the notes the syllables do, re, mi, fa sol, la, ti, do; the two semitones occur between E and F (mi and fa) and B and C (ti and do). When the scale is graduated all the way by a series of twelve half-steps, or semitones, it is called the *chromatic scale*. A scale is said to be *major* when the interval between the keynote and the third above it, as from C to E, consists of two tones; it is called *minor* when the interval between the keynote and its third, as from A to C, consists of a tone and a half. See MUSIC.

SCALE INSECT, or **BARK LOUSE**, one of a large number of different species of insects which attach themselves to all parts of plants, where they remain in order to suck the juices. They are very small and cover themselves with scales, which are either naked or covered with cottony down or hair. Some species are serious pests and affect not only choice garden and hothouse plants, but also the fruit-bearing trees and shrubs. Of the 1,400 or more known species, almost 400 are prevalent in America. An emulsion of kerosene or crude petroleum will usually control the pest when the insects are young. See LAC.

SCALES, thin, flat membranous or horny plates, usually overlapping, which form the covering of certain animals, especially fishes. Some lizards and serpents also are covered with scales, and a few mammals, notably a species of anteater. Scales vary in shape, size and arrangement, according to the genus of animal.

In botany, the word *scale* is applied to small, bracted leaves, scalelike in form, whose function seems to be that of protecting the more delicate plant organs. A common instance is found in the scales which protect the leaf buds during the winter.

SCALLOP, *skol'lop*, the common name of a genus of mollusks related to the oysters. There are numerous species, of which the common and great scallop are the most familiar forms. The latter is esteemed a delicacy in the markets of London. It was a shell of this species that in the Middle Ages was carried in the hats of pilgrims as a token of their pilgrimage to the Holy Land. The shell is somewhat rounded and ends in a triangular ear, in which the hinge is placed. Two species of scallop are found along the Atlantic shores of North America.

SCALP, the outer covering of the top and back part of the skull. It consists of the

skin, which, with the exception of the growth of hair, differs little from ordinary skin; the tendon of the muscle that wrinkles the forehead horizontally and moves the scalp; cellular tissue, and blood vessels. Injuries to the scalp, especially severe burns, often result in erysipelas and inflammation. The word *scalp* is also applied to the circular piece, about four inches in diameter, taken by the Indian from the crown of the head of his victim. In 1755 Massachusetts offered £20 (about \$100) for the scalp of an Indian woman or child and £40 for that of a male. During the Modoc War in 1873 scalps were taken by the troops.

SCAMMONY, *sham'oni*, a climbing, twining plant which grows in abundance through Syria and Asia Minor. It resembles the common bindweed, though larger, and has a stout tap root, from which a common drug is taken. Scammony is blackish-gray, with a nauseous smell and a sharp, bitter taste, and is given in medicine where a strong cathartic is needed.



SCAMMONY

SCANDINAVIA, the name formerly applied to the kingdoms of Norway, Sweden and Denmark or of Norway and Sweden alone, and still frequently used in referring to these countries. It is also the name of the peninsula containing Norway and Sweden. The term now has no political significance. See DENMARK; NORWAY, SWEDEN.

SCAPEGUAT, *shayp'goht*, in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessed the sins of the people and transferred them to the head of the goat. The animal was then sent into the wilderness, bearing the iniquities of the people. In modern phraseology the word is used to designate an innocent person who is made to bear the blame of others.

SCAPULA. See SKELETON

SCARAB, *skar'ab*, the sacred beetle of the Egyptians, sometimes called *dung beetle*,

from its habit of enclosing bits of refuse into pellets and using them as food. Scarabs were believed to resemble the shape and



SCARABS

luster of the sun and to symbolize immortality. Figures of it, plain or inscribed with characters, were employed as amulets and seals. Large numbers of artificial scarabs, made of hard stone or gems, are still to be found in Egypt.

SCARLET FEVER, a very contagious disease that is often fatal and that frequently leaves serious disorders of the system in its train. It begins with something like an ordinary cold, with sore throat, which is, however, followed by a high fever and scarlet eruptions on the body. One variety of the disease is very light, while another is more severe, and in a third form the symptoms increase in violence with great rapidity, and the disease proves fatal within two or three days. In a majority of cases the fever begins to fall after the fifth day, and the recovery thereafter is gradual. Not infrequently death occurs as a result of complications, rather than of the disease itself. Dangerous diseases of the kidneys supervene, and inflammations which may result in deafness and in loss of the power of speech, as well, form often in the throat or in the inner ear. The appearance of kidney complications is usually noticed in that stage of the disease during which the flakes of skin are peeling off, and at this time dropsy is frequent.

A person suffering from scarlet fever is peculiarly liable to the infection of bacterial diseases, and pneumonia and diphtheria frequently follow. Scarlet fever is not strictly a disease of childhood, though comparatively few adults have it. From its seriousness it is evident that each case should be carefully treated and that the patient should also be guarded against cold or infection from any other disease throughout his convalescence. From its peculiar contagiousness, it is evident that each case should be carefully isolated and that thorough disinfection should follow recovery. The germs have been known to remain active in clothing and elsewhere for

a long time. It should be remembered, too, that the contagion is active during that stage of the disease when the body is shedding the poisonous scales. The child should be kept away from others for six or eight weeks, in order that it may be certain that he is not a source of infection.

SCHELDT, *skelt*, a river of Belgium and the Netherlands, 250 miles in length, rising in the French department of Aisne and flowing in a northerly and then northeasterly direction, merging with the Rhine delta and opening into the North Sea. About fifteen miles below Antwerp it divides into the East Scheldt and the West Scheldt, forming a double estuary and enclosing the islands of South Beveland, North Beveland and Walcheren. It is one of the most important waterways of Europe, being navigable by means of a series of locks for 210 miles and connected by canals with the cities of Belgium and France. At Antwerp it has a breadth of 1,600 feet and forms a secure harbor for the largest ships. For 200 years previous to 1863, the Scheldt was in the hands of the Dutch, who levied a toll on all foreign vessels. In 1863 it was made a free waterway by the Treaty of Brussels.

SCHENECTADY, *she neh'ta di*, N. Y., the county seat of Schenectady County, sixteen miles northwest of Albany, on the Mohawk River, on the New York State Barge Canal and on the New York Central and the Delaware & Hudson railroads, and electric lines. It is an important industrial city, with about 140 manufacturing establishments, producing electrical supplies, clothing, insulators, locomotives, foundry and machine shop products, brooms, brushes and many other goods. Union College is located here. Some of the prominent buildings are a courthouse, a city hall, an opera house, a Y. M. C. A., a Carnegie Library, a Federal building and a high school which cost \$550,000. There are four parks aggregating about 190 acres. Schenectady was settled by Arent Van Corlear in 1662. The French and Indians massacred most of the inhabitants in 1690 and burned a part of the settlement. It was incorporated as a borough in 1765, and was chartered as a city in 1798. Population, 1920, 88,723; in 1930, 95,692, a gain of 8 per cent.

SCHILLER, *shil'ur*, JOHANN FRIEDRICH CHRISTOPH VON (1759-1805), one of the greatest of German dramatists and poets, was born at Marbach, Wurttemberg. His father

was superintendent of the woods and gardens attached to a residence of the duke of Wurttemberg, and the duke had the boy educated in a military academy, which he himself had founded at the castle of Solitude.

Here Schiller studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended, he turned his attention to medicine. In 1780 he was appointed physician to a regiment in Stuttgart, and it was now for the first time that he had enough leisure and freedom to finish his tragedy of *The Robbers*, begun three years previously. He published this piece at his own expense in 1781; it attracted an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the Duke of Wurttemberg, and forbidden by the same despotic authority to write plays, Schiller fled from Stuttgart and settled at Mannheim, as poet to the theater. Here the plays of *Fiesco* and *Cabal and Love* were soon afterwards produced.

In 1785 he went to Leipzig and Dresden, where he studied the history of the times of Philip II, to prepare himself not only to write his drama of *Don Carlos*, which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands*. Visiting Weimar in 1787, he received a friendly welcome from Wieland and Herder, and later he made the acquaintance of Goethe, with whom he formed a close friendship. Goethe secured for him a professorship at Jena, and here he lectured on history and published *Historical Memoirs from the Twelfth Century to the Most Recent Times* and his *History of the Thirty Years' War*. It was then, also, that, through the influence of Goethe, he returned with renewed ardor to poetry and produced his finest lyrical poems and ballads. Among these are *The Diver*, *The Cranes of Ibycus*, *The Glove* and *The Song of the Bell*, the finest of German lyrics. It was after 1798 that he published in succession the dramas of *Wallenstein*, *Maria Stuart*, the *Maid of Or-*



SCHILLER

leaves, the *Bride of Messina* and *William Tell*, thus last his greatest work. In 1802 he was raised to the rank of nobility. In German literature Schiller stands second only to Goethe, and his works are perhaps read more than those of Goethe.

SCHILLING, *shilling*, JOHANNES (1828-1910), a German sculptor, born at Mittweida, Saxony. He studied art at Berlin, Dresden and Rome, and in 1868 became professor at the Dresden Royal Academy. His chief works include his masterpiece, the *German National Monument*, on the Niederwald, opposite Bingen on the Rhine; the *Four Seasons*, at Dresden; a statue of Schiller, at Vienna; and the *War Memorial*, at Hamburg.

SCHLESWIG - HOLSTEIN, *shlats'vK hole'stine*, the name applied to two provinces lying south of Denmark which were ceded by that country to Austria and Prussia in 1864, and which Prussia seized from Austria in 1866. The territory was incorporated in the German Empire as a province of Prussia in 1871, and remained a part of Germany without division until 1919. According to the peace treaty imposed on Germany by the victorious allies plebiscites (votes) were to be taken in three zones to determine which part of the province should revert to Denmark. The result of the vote was that the northern province was restored to Denmark, and the south part remained in Germany.

The area of Schleswig-Holstein is about 7,340 square miles, or a little less than that of New Jersey. Schleswig is the northern part and Holstein is the southern part. Schleswig-Holstein forms a part of the same peninsula with Jutland, to which, in its general character, it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of hills and in Holstein by lofty dikes. The east coast is scooped out into natural harbors. The principal streams flow to the west, toward which for the most part the country slopes in gradual stages.

In the tenth century and the early part of the eleventh century, Schleswig formed part of Germany, but in 1027 it was ceded to Canute of Denmark. In the thirteenth century it was made a duchy, under the control of Denmark, and late in the fourteenth century it came under the control of the count of Holstein. When in 1460, on the extinction of the Holstein dynasty, Schleswig-

Holstein chose Christian I of Denmark as ruler, provision was made that they should never be separated from each other or be incorporated with Denmark. Although thus closely united, the two duchies differed widely from each other, Holstein being almost completely German, and Schleswig, Danish.

A proclamation of the Danish king, issued in 1848, that Schleswig was to be incorporated with Denmark, brought on a rebellion throughout Schleswig-Holstein, which was aided by Prussia and other German states. Denmark was defeated, and in the following year, when hostilities began again, the Danes were a second time driven from Schleswig. In 1851, however, Prussia and Austria again entered the struggle, this time on the side of Denmark, and the result was the suppression of all revolt.

Bismarck in 1864 induced Austria to join with Prussia in an attempt to compel Denmark to withdraw Danish rule from Schleswig-Holstein, and when Denmark refused, open war began. The result was the defeat of the Danes and the cession of Schleswig and Holstein to Austria and Prussia. By a treaty between these two nations, Schleswig was placed under the control of Prussia, while Austria regulated affairs in Holstein. As Bismarck had expected, the differences between Austria and Prussia over the management of the duchies led, in 1866, to war (see SEVEN WEEKS' WAR), the outcome of which was the union of Schleswig-Holstein with Prussia. See GERMANY; WORLD WAR.

SCHLEY, *sly*, WINFIELD SCOTT (1839-1911), an American naval officer, born in Frederick County, Md., and graduated from the United States Naval Academy in 1860. He fought in the Civil War, and afterwards taught in the Naval Academy. His first noteworthy achievement was his rescue of the Arctic explorer Greely. Greely had gone north with his expedition in 1881, and had not been heard from for two years. Schley, then a commander, volunteered his services as head of the relief expedition, which set sail in 1884, found Greely and six of his followers and brought them back. A gold medal was awarded him in recognition of this service, and two years later he was made a captain.

In the course of a command at Valparaiso, Chile, some of his crew were killed by natives, and Schley negotiated a satisfactory settlement with the Chilean government.

After serving several years as lighthouse inspector, he was promoted to the rank of commodore, and in 1898 when war was declared with Spain he was placed in command of the Flying Squadron. In the temporary absence of Rear-Admiral Sampson occurred the Battle of Santiago, and Schley, in command of the blockade, destroyed the Spanish fleet. He was promoted to the rank of rear-admiral.



WINFIELD SCOTT
SCHLEY

After the close of the war a number of statements derogatory to Admiral Schley's conduct during the war were made by officers of the navy, and Schley requested the Secretary of the Navy to have these charges investigated. The court criticised Schley's management of the squadron at the beginning of the war, but commended his conduct in the battle with the Spanish fleet, and no further action was taken.

Admiral Schley was a member of the commission which directed the evacuation of Porto Rico. After serving two years as commander of the South Atlantic squadron, he retired.

SCHMALKALDIC, *shmal kah'l'dik*, **LEAGUE**, a league entered into at Schmalkalden in 1531, by several Protestant princes and free cities, in common defense of their faith and political independence against Emperor Charles V and the Roman Catholic states. Among the organizers were the elector of Saxony; his son, John Frederick, and Philip of Hesse. The rulers of Saxony were empowered to manage its affairs. In the war of the Schmalkaldic League against Charles V (1546-1547), Charles was at first successful. In his victories he was aided by Maurice of Saxony, who had been a member of the Schmalkaldic League, but who, tempted by the promise of the electorate of Saxony, had gone over to the side of the Emperor. At Mühlberg (1547), the Protestant forces were totally routed, and both the elector and Philip of Hesse fell captive to the Emperor. At this juncture, however, Maurice returned to his former allegiance and organized a revolt. Making an alliance with Henry II of France,

he led the League again into the field and by several successive victories forced the emperor to grant the Treaty of Passau, in 1552, guaranteeing absolute freedom of worship to the Protestants. See REFORMATION, THE.

SCHOFIELD, *scho'feld*, JOHN MCALLISTER (1831-1906), an American soldier, born in Chautauqua County, N. Y. After graduation from West Point he taught there and at Washington University, Saint Louis, Mo., and at the outbreak of the Civil War entered the Union service as major of the First Missouri Volunteers. Later in the year he was appointed brigadier-general, and afterwards was placed in command of the Missouri militia. The following year he was made major-general of volunteers and rendered conspicuous service to the Union in Sherman's Georgia campaign and in the Battle of Franklin. He was active in the campaign against Hood in Tennessee and later captured Wilmington, N. C. In 1868 he was appointed Secretary of War to succeed Edwin M. Stanton; in 1869 was made major-general of the United States army, later was appointed general in chief, and was made lieutenant-general by President Cleveland in 1895, but retired the same year. He wrote *Forty-Six Years in the Army*.

SCHOLASTICISM, *scho las'ti siz'm*, the philosophy taught by the teachers of the Middle Ages, who were called Scholastics, or Schoolmen, because their philosophy originated in schools established by Charlemagne and others for the education of the clergy. Scholasticism attempted to harmonize the tenets of the Church with the logic of Aristotle, just restored to Europe by the Saracens. Among the most distinguished of the thirteenth-century exponents of scholasticism were Albertus Magnus, Roger Bacon, Duns Scotus and Saint Thomas Aquinas. The movement awakened the mental life of Europe and prepared the way for the Renaissance.

Related Articles. Consult the following titles for additional information:
 Aquinas, Saint Duns Scotus
 Thomas Renaissance
 Bacon, Roger

SCHOOL DISTRICT, the smallest political division for any governmental purpose, except some city wards. It is a political section devoted wholly to education, and in rural communities is usually two miles square. It approaches closer than any other unit to a pure democracy, for all adult residents are

qualified to participate in its annual meeting. The officers of a school district are called trustees, are usually three in number, and one is elected each year.

Some children in studying geography may well begin with the school district, because it is small and the facts respecting it can be readily comprehended. The outline for study may be somewhat like that given below:

The School District

- (a) Political features
 - (1) Map
 - (2) Location in township
 - (3) Numbers or names of surrounding districts
 - (4) Area (sections included)
 - (5) Roads
 - (6) Population
 - (7) School population
- (b) Physical features
 - (1) Rivers
 - (2) Creeks
 - (3) Valleys
 - (4) Plains
 - (5) Hills or mountains
 - (6) Swamps

SCHOOL GARDEN. The school garden movement is international in scope. In Europe the cultivation of small plots of ground by pupils has long been an established feature of the school systems, and within recent years the idea has found widespread favor in both the United States and Canada. In the former country the Bureau of Education in 1914 inaugurated a plan of school-directed gardening that proved very successful. The plan consisted in enlisting boys and girls of elementary school age in systematic garden work on available ground in backyards, vacant lots or school yards. Teacher directors were appointed to supervise the work, and parents were urged to cooperate with the young gardeners in every way possible. In March, 1918, the name United States School Garden Army was adopted, and a special campaign for enlistments was begun. Within one year 3,000,000 school boys and girls had joined the army. The following suggestions on plans of organization have been published:

Number of members in a company Ten to 150

Age limit. Any school child, but preferably the more important companies should be enlisted from the pupils above the third grade.

Requirements for enlistment. The signing of an obligation card in which the pupil agrees to raise one or more food crops and to keep records of his work and the results, reporting them to the teacher or garden supervisor. These cards will be furnished by the Bureau of Education.

Officers. Each company to have a captain and one or two lieutenants, the latter depending upon the number of soldiers enlisted.

Insignia. For the privates, a service bar with U S S G in red letters on a white background, with a border of blue. For the second-lieutenant, the same bar with one white star in the border. For the first-lieutenant, the same bar with two white stars in the border. For the captain, the same bar with three white stars in the border. For the garden teacher or supervisor, similar insignia without stars, with blue letters and a red border.

Enlistment of existing organizations. Any organization of school children now doing garden work will be eligible to enlistment. Such organizations may keep their existing form, if they so desire, and have the additional impetus of belonging to a national army fostered by the President, the Secretary of Interior and the Commissioner of Education. The aim of this army is to nationalize and unify the great work now being carried on among school children of America.

From the standpoints of health, economics and education, school gardening has much to commend it. It has been estimated that 5,000,000 boys and girls can produce in a season \$250,000,000 worth of food, an important fact in view of destitute conditions in many parts of the world following the World War. Transportation congestion is also relieved through the consumption of products raised in the community. The young gardeners themselves are taught valuable lessons of thrift and economy, they gain practical experience in agriculture, and they learn many important facts in botany and zoology.

With a return to normal conditions after the war and the heralding of prosperous times to come, the enthusiasm for school gardens began to decline.

See Boys' and Girls' Clubs; Gardening. For further information write to the Director of the School Garden Army, Washington, D C.

SCHOOL SAVINGS BANKS. See SAVINGS BANKS.

SCHOOLS. In its broadest sense, the term *school* is used to designate a place where instruction is given in the arts, sciences, professions and ordinary vocations, and includes grammar schools, vocational schools, evening schools, high schools, academies, colleges, universities and technical schools. Most commonly, however, the name is restricted to institutions below college rank. The founders of America realized that the state must rely upon an educated citizenship for its continued existence. The only clause of the famous Ordinance of 1787 that is now remembered is the following:

Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

In pursuance of this policy the states erected out of this vast territory, and those from other territory as well, have organized and maintained an excellent system of public schools.

Schools, Consolidated. In many sections the one-room rural school is at a great disadvantage because of the small number of pupils and lack of adequate funds for its support. Because of these disadvantages many families send their children to some near-by town where they can have the advantages of a graded school. Many of these children acquire a liking for town life, and when grown up they depart for the city.

To meet the demand of rural communities for schools equal to those in the towns, the plan of consolidating a number of adjoining school districts with small schools into a single district, and establishing one school with enough pupils and money to make it equal to the town school in equipment and efficiency, has been successfully carried out.

Many states now have laws providing for the consolidation of rural schools, and these laws make provision for transporting the pupils to and from school at the districts' expense. In many places graded schools have been established, and schoolhouses equipped for domestic science and manual training have been erected. Moreover, these schoolhouses contain assembly rooms where lectures and other entertainments are given, and the schoolhouse becomes the community center for many activities that enrich rural life.

Correspondence Schools, educational institutions in which instruction is given to pupils by mail. This system of education is the result of a general demand for the extension of higher instruction to many persons who are unable to attend high schools, normal schools or colleges. It is especially intended for students of small means, who are prevented by financial or other considerations from continuing their studies beyond grammar school or high school courses. By means of the correspondence school a person employed may continue his studies, or pursue a course of training that will prepare him for a different vocation. Many men and women holding positions of responsibility owe their advancement to the training they received

through a reputable correspondence school.

The movement which gave correspondence schools a sanction in the United States was inaugurated in 1895 by President William R. Harper, of the University of Chicago. Dr. Harper declared that he could teach Sanskrit by mail as effectively as in the classroom. Later the university established a correspondence department, in which a student can take a part of any course by correspondence and receive credits for the work completed, but he must complete his course at the university. Following the example of the University of Chicago, other universities established correspondence departments, and the University of Wisconsin has extended its field to cover practically every occupation and the educational needs of any citizen in the state.

While instruction by correspondence may be given in nearly all lines of study, it is most successful when applied to industrial subjects, and by far the largest number of correspondence students are pursuing subjects pertaining to some line of industry.

Secondary Schools, schools ranking in grade between the common schools and the colleges. In the United States they include high schools, academies, and seminaries whose courses of study do not extend beyond preparation for college. The high schools are under city or township control, and in the newer states the most advanced are affiliated with state universities, so that their graduates can enter those institutions without examination (see HIGH SCHOOL). Academies and seminaries are usually under denominational control. Many of these schools maintain, in addition to a college preparatory course, departments in commerce and finance, art and music. The secondary schools of Germany are known as *realschulen*.

Related Articles. A complete list of the topics connected with the subject will be found at the end of the article EDUCATION. See also, HIGH SCHOOLS.

SCHOOLS, MILITARY. See MILITARY SCHOOLS.

SCHOPENHAUER, *sho'pen how er*, ARTHUR (1788-1860), one of the foremost philosophers of the nineteenth century, who originated a system which has become the classic of philosophical pessimism. Taking Kant as his point of philosophical departure, he attempted to reconcile the two contradictory elements in Kant's system—idealism and realism—by defining Kant's "thing-in-

itself" as *will* and regarding it as the "only necessary reality in the universe." By "will" he means not conscious choice, but blind, unconscious force which aims at no rational end. He holds that there is no ground for hope that things will be better; therefore it is the highest wisdom to adopt an attitude of resignation—to relinquish all desire, all aspiration and passively acquiesce to inevitable circumstance. The position is closely akin to the ancient Hindu idea of Nirvana (see *Buddhism*).

Schopenhauer was born at Danzig, Prussia, the son of a wealthy banker, and was educated at the universities of Göttingen and Jena. Between 1814 and 1818 he lived at Dresden and there wrote his celebrated work, *The World as Will and Idea*. After travels in Italy he went to Berlin in 1820, and there attempted to lecture in competition with Hegel, who was then a favorite. Failing to gain coveted recognition, he retired in morose disappointment to his home at Frankfurt-on-the-Main, and there, except for short intervals, spent the rest of his life.

SCHUBERT, *shoo'burt*, FRANZ (1797-1828), one of the great masters of music, possibly the greatest song-writer who ever lived. He was born at Vienna, of a musical family, from whom he learned the rudiments of violin and piano playing. His mastery of music came, however, chiefly through independent study of the masterpieces and through association with a brilliant group of fellow musicians. Schubert's was a radiant personality; he was blessed with a large circle of loyal friends, and these constituted almost the only external compensation in a life of terrible drudgery, poverty and cruel disappointments. Lack of proper recognition for his work reduced him to the necessity of teaching school. Composing was done in spare moments and in feverish haste.

No other composer has been known to work with sustained effort at such incredible speed. In the course of his short life he produced more than six hundred songs, including the immortal *Erkling*, the popular *Hark, Hark the Lark*, and *Who Is Sylvia*, *Wanderer* and



SCHUBERT

Serenade; ten symphonies; fifteen operas besides a large number of miscellaneous works for violin, piano or voice. His *Symphony in C Major* and *Unfinished Symphony* are among the imperishable masterpieces of music.

Liszt called Schubert the most poetic musician that ever lived; and Schumann said, "He has strains for the most subtle thoughts and feelings."

SCHUMANN, *shoo'mahn*, ROBERT (1810-1856), a celebrated German composer of songs and a pianist and musical critic, was born at Zwickau, Saxony. He studied law at Leipzig, but after 1830 devoted himself entirely to music. A noted pianist, Clara Wieck, daughter of his teacher, became his wife in 1840. In 1834 he founded the *Neue Zeitschrift für Musik*, a journal which for ten years exercised an important influence upon the development of music, giving loyal support to Chopin, Brahms, Berlioz, Schubert, Mendelssohn and other rising musicians. In the year following his marriage, Schumann wrote some of his finest songs and his first symphony. During a residence in Dresden, 1840 to 1844, he composed the cantata *Paradise and the Peri* and a quintet for the piano, and began his composition of the music for Goethe's *Faust*.

In 1850 the Schumanns moved to Düsseldorf, where, under stress of work, his mind failed him, and he died in a private asylum for the insane. Schumann ranks with Schubert as a composer of songs and with Chopin and Liszt as a master of piano technique. Many of his songs were written to poems of Goethe, Heine, Byron, Moore and others. An edition of his complete works, edited by his wife, includes thirty-four volumes.

SCHUMANN-HEINK, *hynke*, ERNESTINE (née ROESSLER) (1861-), one of the foremost of German contraltos, was born near Prague, Bohemia, and educated in that city. At the age of seventeen she made her debut at Dresden as Azucena in *Il Trovatore*, and for several years continued to sing in opera and concert. She was married in 1882 to a Mr. Heink, and ten years later to Paul Schumann. In 1905 she was married to William Rapp, Jr., from whom she was divorced in 1915. Madame Schumann-Heink made her first American appearance in 1898 as a member of the Metropolitan Grand Opera Company, New York, and her popularity grew with the years. Madame Schu-

mann-Heink was the mother of a large family. Two of her sons fought for Germany in the World War and two were in the allied forces; one was killed in battle. After the war she gave her California estate as a home for disabled soldiers and their families. In 1936, at the age of 75, she contracted to appear in moving pictures.

SCHURMAN, *shoor'man*, JACOB GOULD (1854-), once president of Cornell University and later a diplomat, was born at Freetown, Prince Edward Island, and was graduated from the University of London; later he attended the Universities of Edinburgh, Heidelberg, Berlin and Göttingen. He became successively professor of philosophy in Acadia College and Dalhousie College, Sage professor of philosophy at Cornell, and in 1892 president of Cornell University. He was appointed chairman of the first United States Philippine Commission in 1899. He was minister to Greece (1912), Ambassador to China (1921), and later, Ambassador to Germany. Schurman wrote a large number of books principally devoted to religion, ethics, and history, and these greatly influenced the times in which he lived.

SCHURZ, *shoor'ts*, CARL (1829-1906), a prominent American orator and political leader, born at Lublar, Prussia, and educated at the universities of Cologne and Bonn. His liberal ideas forced him to quit Germany in 1848, and he acted as a newspaper correspondent from Paris and London. In 1852 he emigrated to the United States and settled in Watertown, Wis. In 1857 he was an unsuccessful Republican candidate for lieutenant - governor and two years later he began to practice law in Milwaukee. He was made brigadier-general in the Federal army in 1862 and fought at Bull Run, Chancellorsville, Gettysburg and Chattanooga. After the war he became a newspaper correspondent, and finally editor of the Saint Louis *Westliche Post*. In 1869 Schurz was elected to the United States Senate. He was appointed by President Hayes as Secretary of the Interior, and at the close of the administration he became editor of the New York *Evening*



CARL SCHURZ

Post. He was president of the National Civil Service Reform League from 1892 to 1901.

SCHUYLER, *sk'ler*, PHILIP (1733-1804), an American statesman and general of the Revolutionary war, was born at Albany, N. Y. He served with great credit in the French and Indian War, and was elected a delegate to the Continental Congress in 1775. Soon after the Battle of Bunker Hill he was appointed major-general in the Continental army, in command of the Northern New York division. Later he fought against Indians and Tories in New York and made a treaty of alliance with the Six Nations. Hampered and accused by superior officers, he resigned his commission, demanded a court of inquiry, and was acquitted with honor. He remained in the army, but was superseded by General Gates. To Schuyler, however, belongs the credit for Burgoyne's surrender (see SARATOGA, BATTLES OF). Schuyler was later elected to numerous state offices and to the United States Senate.

SCHUYLKILL, *skool'kil*, a river which rises in the northeastern part of Pennsylvania, in the Blue Mountains, and flows southward into the Delaware, five miles below the city of Philadelphia. It furnishes the chief water supply of Philadelphia, and power for manufacturing plants at Reading, Pottsville, Phoenixville and Morristown. Its length is 120 miles, and it is navigable as far as Philadelphia for boats of 400 tons.

SCHWAB, CHARLES M. (1862-), an American capitalist and president of the United States Steel Corporation, was born at Williamsburg, Pa. His first connection with the steel industry was as a stake driver in the engineering corps of the Edgar Thompson Steel Works, of which institution he later became superintendent. He rose steadily to the position of general superintendent of the Homestead Steel Works, and in that capacity served until 1897. In 1903 he became president of the Bethlehem Steel Corporation, which prospered wonderfully under his control; in 1915 he went to London and secured enormous munition contracts to supply the allies during the World War. In 1918 Schwab was appointed director-general of shipbuilding, in the United States Shipping Board Emergency Fleet Corporation. He is the author of an inspirational book, *Making Life Worth While*.

SCHWATKA, *shwoot'ka*, FREDERICK (1849-1892), an American Arctic explorer, born at Galena, Ill. He was graduated from West Point in 1871 and was occupied with garrison duty on the frontier until 1877. Meantime, he continued his studies and was admitted to the bar in Nebraska and received a degree in medicine in 1876. Two years later he started for the north polar region in search of Sir John Franklin and his party. After a journey fraught with great peril, he returned with evidence of the final destruction of the Franklin expedition. Later he explored the Yukon River in Alaska and also made several expeditions through unknown parts of Mexico. He has narrated his experience in three books, *Along Alaska's Great River*, *Nimrod in the North* and *Children of the Gold*.

SCIATICA, *si'at'lah*, neuralgia of the nerve trunk which passes down the back of the thigh, called the great sciatic nerve. It is caused usually by exposure, strain, pressure of constipation, and usually attacks persons subject to gout or rheumatism, but is sometimes a complication of spinal disease, diabetes and other disorders. Severe pain in the region of the hip is the chief symptom. If not properly treated sciatica tends to become chronic. Treatment includes rest, injection of medicine into the nerve and, in severe cases, local operation.

SCIENCE AND THE SCIENCES.

Science is a term derived from the Latin verb *scire*, meaning *to know*; therefore in the broadest sense of the term *science* means *knowledge*. But in the sense in which it is ordinarily used, it means knowledge gained through observation and study and organized by experience into a systematic whole. However, when we consider science in this light, we apply it to some branch of knowledge, which we call a *science*—such as the science of botany, or the science of ethics. In our study of science, then, we are dealing more with the *sciences* than with science in the abstract.

The ancient Greek philosophers, to whom we look for the first classification of sciences, had little difficulty in making their classifications. Aristotle, for instance, divided all sciences into three classes—theoretical, practical and poetical, meaning by poetical, creative or technical sciences. But as knowledge was extended, a more complete classification of its various branches became necessary, and now we have almost as many sciences as there are branches of knowledge.

We are inclined, however, to narrow our conception of the sciences to those branches of knowledge that pertain to the phenomena of nature, or to what we are pleased to call the natural sciences. Such a conception is too narrow, for we have sciences that deal with human conduct, as well as with phenomena of nature. Among such sciences are aesthetics, ethics and civics.

The truly scientific investigator never jumps at conclusions, he never takes anything for granted. Unless the supposition under consideration is backed by sufficient evidence to warrant its acceptance he lays it aside for further investigation. He works from his knowledge of the general law of cause and effect, knowing that under the same circumstances the given conditions always lead to certain results.

Pseudo Sciences, a term describing so-called beliefs and practices out of which grew the organized scientific knowledge of to-day. It also includes various cults that have persisted through the ages which are not to be explained on rational grounds. Examples of the first group are alchemy, the forerunner of chemistry, astrology, which developed into astronomy. In the latter category may be classed clairvoyance, mind reading, superstition, palmistry, phrenology, telepathy, physiognomy, spiritualism, mesmerism, faith cure, theosophy, etc., which true science cannot accept.

Related Articles. The following are the most important branches of science treated in these volumes

Algebra	Mathematics
Anatomy	Meteorology
Anthropology	Mineralogy
Archaeology	Numismatics
Arithmetic	Oceanography
Astronomy	Paleontology
Biology	Philology
Botany	Philosophy
Calculus	Phonetics
Chemistry	Physical Geography
Economics	Physics
Ethnography	Physiology
Ethnology	Phonetics
Eugenics	Sanitary Science
Geography	Sociology
Geology	Zoology
Geometry	

SCILLY, *sil'y*, ISLANDS, a group of about 140 small British islands situated at the entrance of the English Channel, about thirty miles from Land's End. Six islands are of some importance, the others being mere points of rock. The inhabitants are engaged in fishing and in the cultivation of flowers and vegetables. Population, about 2,500.

SCIPIO, *sip'e o*, PUBLIUS CORNELIUS (237-about 185 B. C.), surnamed **SCIPIO**

AFRICANUS THE ELDER, one of the most illustrious of Roman warriors. He took part in the battles of Ticinus and Cannae, in the first Punic War, and in 212 B. C. was unanimously elected aedile. The following year he became proconsul in Spain. His first enterprise of importance was the conquest of New Carthage, the stronghold of the Carthaginians in Spain. The next year (209) he totally defeated Hasdrubal, Hannibal's brother, and in 207 won a decisive victory over Mago and Hasdrubal, the son of Gisco. The result was to drive the Carthaginians from Spain, and Scipio was empowered to lead an army against Carthage itself. The Carthaginians recalled Hannibal from Italy, but the great Battle of Zama (202 B. C.) resulted in the total defeat of the Carthaginians. On his return to Rome, Scipio was honored with a triumph and received the surname of *Africanus*. After the successful close of a war with Antiochus, king of Syria, in 189 B. C., Scipio retired to private life. See **CARTHAGE**; **ROME, HISTORY OF**.

SCIPIO, PUBLIUS CORNELIUS AEMILIANUS (about 185-129 B. C.), surnamed **SCIPIO AFRICANUS THE YOUNGER**, a distinguished Roman general, a grandson by adoption of Scipio Africanus the Elder. In 151 B. C. he accompanied the consul, Lucius Licinius Lucullus, to Spain as military tribune, and two years later, on the outbreak of the Third Punic War, he commanded in Africa under Manius Manilius. His services were so important that in 147, although not of the legal age, he was unanimously chosen consul and leader of the forces against the Carthaginians. In 146 he took, and by command of the senate, burned, Carthage, for which he was honored with a triumph at Rome and with the surname of *Africanus*. In the last years of his life he engendered much enmity among the people by opposing the measures of the popular party, especially the agrarian law of Tiberius Gracchus.

SCISSORBILL, *siz'er bill*, or **SKIMMER**, a bird of the gull family, named because of its peculiar elongated, compressed bill, of which the lower mandible much exceeds the upper in length and shuts into the latter somewhat after the fashion of a knife blade into its handle. This beak is of an orange color at its base and black at its tip. The bird is found along the Atlantic coasts of America and Africa. It is often seen skimming along the water, thrusting the lower bill

into the water in its search for food. The general color of the bird is dark above and white below, with a band of white across its wings.

SCLEROSIS, *skle ro'sis*, in physiology, a hardening of the tissues in some part of the body. Hardening of the middle coat of an artery is a common form of sclerosis, and causes many deaths among city dwellers. It is frequently associated with heart and kidney diseases. Hardening of the normal tissue of the liver is called *cirrhosis*. Various nervous diseases, notably locomotor ataxia, result from degeneration of the tissue of the brain or spinal cord.

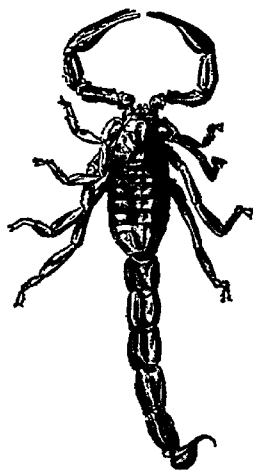
SCORPIO, *shor'pe o*, the eighth sign of the zodiac, the "accursed constellation," considered by astrologers to exercise a baneful influence upon human destinies. In ancient astrology the symbol (♏) was meant to represent the arrow-shaped sting of the scorpion. This constellation is attended at its setting by tempests and autumnal diseases.

Related Articles. Consult the following titles for additional information:

Aries
Astronomy

Orion
Zodiac

SCORPION, the name of a group of animals belonging to the same class as the spiders. They live in tropical and warm temperate regions, and are not found in America north of Nebraska. In the southern part of the United States there are about twenty species. The body consists of two parts, one containing the head and thorax and called the *cephalothorax*, and the other a long, jointed abdomen, the last five segments of which form a tail. Four pairs of legs and two pairs of mandibles or pincers are attached to the cephalothorax; the second pair of pincers resemble a lobster's claws.



SCORPION

The abdomen contains breathing pores and the last segment of the tail is armed with a sharp poisonous sting, the poison being secreted by two glands at its base. The eyes vary in number from six to twelve, according to the species. Scorpions are usually black or yellowish in color. The young are carried on the body of the mother for several days after birth. They cling to her body by the pincers.

Scorpions remain hidden in crevices and under rocks by day, and are active at night. They feed upon insects and spiders, and are dreaded by man because their sting causes a serious and painful wound, though it is seldom fatal. The poison should be sucked from the wound as soon as possible, and the wound bathed with ammonia, which should be also taken internally.

SCORPION FISH, a genus of fishes belonging to the gurnard family. The *red scorpion fish* is a familiar form. The *spotted scorpion fish* is a second species, and, like the preceding, is native to British waters as well as in the Mediterranean, the Atlantic, and the tropical seas. Another species is the common market fish of Southern California, measuring a foot in length and colored brown and olive.

SCORPION FLY, an insect related to the dragon fly. The name *scorpion fly* is derived from the appendages attached to the abdomen of some species. The male in the common species, for example, has the sixth and seventh joints of the abdomen attenuated and capable of extensive motion, while the last joint forms a pair of forceps, resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or defense.

SCOTCH TERRIER, a small dog weighing from fourteen to twenty pounds, with a long head, dark eyes and upright ears. The hair is rough and coarse, and may be black, reddish, brindled or sandy. The tail is carried erect. The dogs are intelligent, gentle and active and in demand as pets.

SCOTCH VERDICT In American courts a person who is tried for an alleged offense before a jury meets with a verdict of "guilty" or "not guilty." In Scotland, in cases where the evidence is not conclusive in either of the above directions, the jury may return the verdict, "not proven." The accused must then be freed.

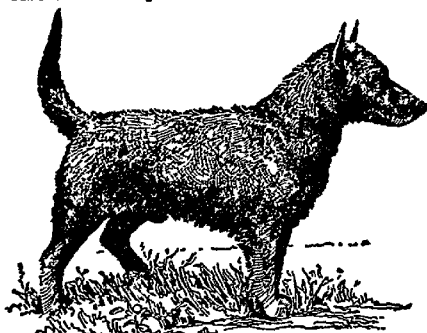


SCOTLAND, the political division of the United Kingdom occupying the northern part of the island of Great Britain, and including the Hebrides, Orkney, Shetland and other islands. It is separated from England by the Cheviot Hills and Solway Firth. Scotland is the Caledonia of the Romans, a land of irregular coasts and rugged surface; of beautiful lakes and hardy people; the land of which Scott sang

O Caledonia! stern and wild,
Meet nurse for a poetic child!
Land of brown heath and shaggy wood,
Land of the mountain and the flood

Scotland's wild beauty, warring factions and devoted heroes have been celebrated in legend, poetry and song until the country is known wherever the English tongue is spoken.

Location and Size. With the exception of the boundary separating it from England Scotland is surrounded by the sea. The coast line is very irregular and has an extent of 2,300 miles. The most northerly point of the mainland is in about the same latitude as Petrograd, the southern point of Greenland and the southern coast of Alaska. The greatest length from northeast to southwest is 287 miles, and the breadth varies from less than thirty to 140 miles. The area, in



SCOTCH TERRIER

cluding islands, is 30,404 square miles, or a little less than that of South Carolina. On the eastern coast the most prominent

tations are Moray Firth, the Firth of Tay and the Firth of Forth, while on the south and west are Solway Firth, the Firth of Clyde, the Firth of Lorne, the Sound of Sleat and Loch Broom. With the exception of the sound, each of these indentations terminates in an estuary.

The People. About one-tenth of the inhabitants of the United Kingdom live in Scotland. The native inhabitants are known as Scots or Scotch. Those occupying the northern portion of the country, particularly the highlands, are of Gaelic descent, and among them the Gaelic language is still spoken, though most of the younger people have learned the English (see CELTS). The southern portion of the country contains a large number of people of English descent. The Scotch are a hardy race, known the world over for their integrity, industry and thrift. The Highlanders are the tallest people in the world, averaging from five feet eight inches to six feet in height. They still retain their ancient style of dress, with the kilt and the plaid for special occasions, and the bagpipe still awakens the echoes of hill and glen. The clan or tribe which has played so conspicuous a part in their history continues to be important in social life. The highland regions are sparsely settled, but in the lowlands the people have gathered in large cities and towns, and the movement city-ward is increasing. In this part of the country fully three-fourths of the inhabitants dwell in cities, of which Glasgow, with over 1,000,000 inhabitants; Edinburgh, with over 440,000, and Aberdeen and Dundee, each having a population of about 160,000, are the most important.

In religion the larger part of the population are followers of the Presbyterian faith, though other Protestant churches have considerable following, and in the larger cities the Church of England is maintained, but neither this Church nor the Roman Catholic Church has as numerous a following, in proportion to the number of inhabitants, as in England or Ireland.

Surface and Drainage. The surface of Scotland is divided naturally into three divisions—the highlands, occupying the northern portion of the country; the central lowlands, immediately southeast of the highlands, and the southern uplands, which include the southern counties. The highland region, which embraces fully one-third of

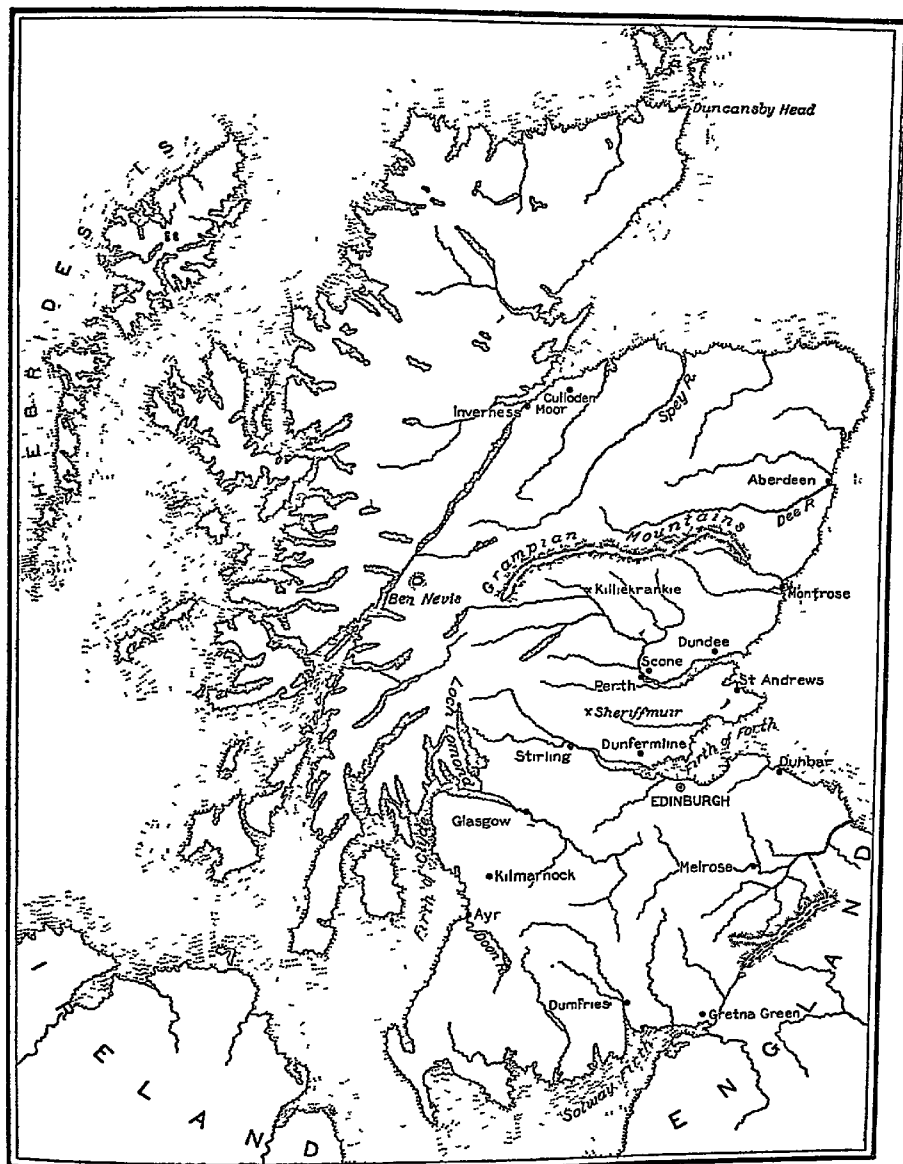
Scotland, is noted for its numerous mountains and hills, the highest of which are the Grampian Hills, containing steep precipices and narrow valleys through which flow rapid streams or in which lie deep and clear mountain lakes. The highest elevation in this region and in Great Britain is Ben Nevis, which attains an altitude of 4,406 feet.

The central lowlands differ from lowlands in most other countries in being widely diversified by low hills, beautiful valleys and numerous lakes and streams. This region and the highlands have for centuries been famous for their beautiful scenery, and it was this portion of Scotland that Scott immortalized in his poems, *Lady of the Lake*, *Lay of the Last Minstrel* and *Marmion*, and in a number of his novels (see SCOTT, WALTER, Sir). In the southern uplands are found numerous ranges of low mountains, one of which, the Cheviot Hills, forms a portion of the boundary between Scotland and England. Another range extends southward into England. These are low mountains, and the highest peaks do not attain an altitude of 3,000 feet, but a number reach a height of 2,700 feet or over. The surface in this part of the country is less broken and irregular than in the highland region.

The most important streams flow to the east and enter the North Sea. The largest of these is the Tweed, and others worthy of mention are the Forth, the Tay, the Dee, the Don, the Spey and the Findhorn. Those entering the sea on the west are the Clyde, the Ayr, the Doon, the Dee, the Nith, the Annan and the Esk. The Tay has the greatest volume of water, but the Clyde has been canalized and thus made navigable for ocean ships as far as Glasgow. This renders it by far the most important commercial waterway of Scotland. The country is noted for its large number of beautiful mountain lakes. Among the most noted of these are Lomond, Katrine, Tay, Earn, Rannoch, Awe, Shiel, Ness and Maree, in the western and northern highlands, Leven in the central lowlands, and Saint Mary's Ken, Dee and Doon, in the southern uplands.

Climate. See GREAT BRITAIN.

Mineral Resources. The southern portion of Scotland is rich in minerals. By far the most important of these is coal, which is mined in large quantities in the County of Lanark, in which Glasgow is situated. Iron ore is found in the County of Ayr, to the



MAP OF SCOTLAND

west of the coal fields. Shale rock, which yields large quantities of shale oil, is extensively quarried in Linlithgow County. Granite, limestone, slate, clay and lead are also produced in paying quantities.

Fisheries. Surrounded, as it is, by cool waters and dotted with a large number of cold, clear streams and lakes, Scotland abounds in fish, and the taking of them constitutes an important industry of the people

The annual catch is valued at about \$20,000,000. The varieties taken in largest quantities are herring, haddock and cod. Steam trawlers are replacing the sailing vessels, and this change is forcing most of the private fishermen out of business, since they do not have the capital to compete with the large boats owned by companies which now control the salmon, whale and seal fisheries. The value of the fisheries fluctuates, but averages more than \$15,000,000 yearly.

Agriculture. Its rugged surface, barren soil and cool climate render a large part of Scotland unsuitable for agriculture. In the lowlands all available land is tilled, and in the highlands and upland regions much of the country is devoted to stock raising. The highlands are well adapted to sheep, and the wool produced is of considerable value. Among the important crops are oats, barley, turnips, potatoes and hay. Forage crops are also raised for fodder. The country is known for its excellent breeds of cattle, among which are found the Ayrshire, the Jersey, the polled Angus and the Galloway (see *CATTLE*). Scotland is also the home of the Clydesdale horse.

Manufactures. The manufactures are important and furnish occupation for fully one-fourth of the inhabitants. The most important manufacturing industries are those producing woollens, cottons and linens. These are followed by the iron and steel industries, whose center is at Glasgow; along the Clyde are found the largest shipyards in the world. Here were built the great ships of the Cunard line, and some of the most famous yachts of the world. The Clyde yards were the center of shipbuilding for the British Empire during the World War. Glasgow is also noted for its manufacture of chemicals, and throughout the country are found breweries and distilleries, some of which have become famous for their products. Edinburgh is noted as one of the great publishing centers of the English-speaking world. In other localities sugar refining and the manufacture of paper, glass, gloves, hosiery and various small wares give employment to a large number of people.

Transportation and Commerce. See *GREAT BRITAIN*, subhead *Transportation and Commerce*.

Education. The public education system of Scotland was reorganized by an act of Parliament passed in 1918. Central administration is under the control of the Scotch Edu-

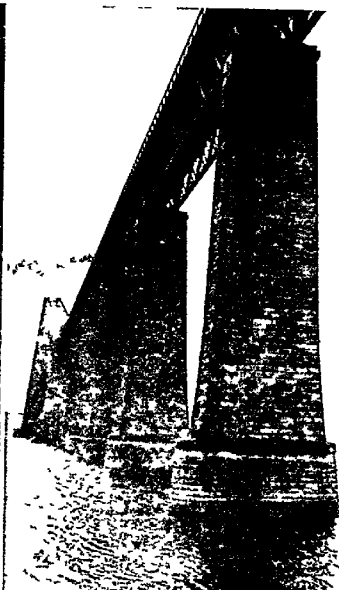
cation Department, which is empowered to establish an advisory council consisting of not less than two-thirds of its membership. The duty of the council is to advise and make recommendations to the department. The counties and the five large burghs act as education authorities administered by boards elected by local government units. The bill also provided for the establishment of nursery schools for children between the ages of two and five, and made school attendance compulsory between the ages of five and fifteen. No exemptions may be granted to pupils below the age of thirteen. Restrictions on the employment of children are rigid.

There are several endowed schools and schools under private management which give high school instruction. Universities are maintained at Saint Andrew's, Glasgow, Aberdeen and Edinburgh. These are aided by government grants and by funds contributed by Andrew Carnegie. Much attention is given to technical instruction, and at Glasgow is the Royal Technical College, the largest school of its kind in the British Empire.

Government. The Local Government Board for Scotland, for the administration of local affairs, was created in 1894. It consists of the Secretary for Scotland, the Governor-General, the Undersecretary and three other members appointed by the sovereign. The counties and parishes are administered by councils, and burghs or town by municipal boards, provosts and bailies.

For the central government, see *GREAT BRITAIN*, subhead *Government*.

Language and Literature. Down to the fifteenth century the term *Scottish language* meant the Gaelic, or Celtic, tongue, while the language of lowland Scotland was looked upon as English. Such it really was—Northern English, with certain peculiarities of its own. The term *Scottish* came to be applied to it as possessing these peculiarities and as having a somewhat distinctive literary use. This language has been divided into three periods. During the *early* period, extending to the end of the fifteenth century, there was little difference between the language of Scotland and that of England north of the Humber. In the *middle* period, which extended to the Union, it was influenced in a slight degree by the Gaelic, and in a more pronounced manner by French and Latin, consequent on the French alliance and the re-



VIEWS IN SCOTLAND

- 1—A bit of Edinburgh, from Princess Street Gardens
- 2—Great Piers supporting approach to Cantilever Bridge over the Firth of Forth
- 3—Typical Farm Scene on the Crinan Canal
- 4—Sunshine and Shadow on Loch Katrine.

Photos from Ewing Galloway



Keystone, Ewing Galloway

IN THE LAND OF THE SCOTS

A Scottish lad, in native kilts, playing the bagpipe, the national musical instrument. A Highland home in the valley of the Tay. An Edinburgh fisherman mending his net near the river front.

vival of learning. During the *modern* period, it has been to a considerable extent affected by modern literary English, though the genuine vernacular may still be heard in many districts.

The *Sir Tristram*, a metrical romance dating from the end of the thirteenth century, doubtfully attributed to Thomas the Rhymer, is by some regarded as the earliest piece of Scottish literature, but the first undoubted specimen of Scottish literature is the *Bruce* of Barbour (about 1375). Down to the middle of the sixteenth century four names stand out prominently, namely, Henryson, Dunbar, Gavin Douglas and Sir David Lindsay. Then, with the exceptions of Alexander Scott, Arbuthnot, Rolland of Dalkeith, Sir William Alexander and Drummond of Hawthornden, about a century and a half elapsed before any eminent poet arose. In the third period of the language the first notable name is that of Allan Ramsay (1686-1758), author of *The Gentle Shepherd* and of numerous shorter pieces and songs. To this same age belongs also nearly the whole of that remarkable body of song known as the Jacobite minstrelsy. The most prominent Scotch writers, aside from those mentioned, are Fergusson, Robert Burns, Hector MacNeill, Sir Walter Scott, James Hogg, Robert Tannahill, Joanna Bailly, George MacDonald, Robert Louis Stevenson, John Watson and J. M. Barrie. Besides these there is a long list of philosophers, legal writers and physicians, such as Adam Smith, Barelay and Liddell.

History. The part of the island of Britain which lies north of the Firth of Forth and the Clyde was known by the Romans from the first century A. D. as Caledonia. The name *Scotia* (Scotland), limited in the early periods to Ireland, was used from the tenth century on for a part of Scotland, and after the thirteenth century it was applied to the present realm of Scotland. The oldest inhabitants of the country were the Picts. When the Romans, during the time of the emperor Claudius, conquered the southern part of Britain, the northern part, Caledonia, remained independent. When Agricola was in Great Britain he made several incursions into Caledonia and won some victories, but after his recall these advantages were lost by the Romans. As a protection on the north for their British territory, the Romans during the time of Emperor Hadrian

built a wall between the Firth and the Tyne. Under Antonius Pius a second wall was built farther north. In spite of these fortifications, however, Britain was constantly, after the third century, disturbed by invasions of the Picts. About the middle of the fourth century, the Scots, who had come from Ireland and settled in the northwestern part of Caledonia, began to take part in these invasions.

The history of Scotland during the time of the Anglo-Saxon conquest of Britain is enveloped in mystery. In the seventh century, when we again have historical accounts of the country, it is found divided into four kingdoms, those of the Scots, the Picts, the Britons and the Saxons. About the second half of the sixth century, Christianity had been introduced among the Picts, and the Scots had brought Christianity with them from Ireland. In 843 the king of the Scots, Kenneth, made himself ruler also of the Picts, and the kingdom thus formed was known for a time as Alban and later as Scotland. Early in the ninth century, Scotland began to be disturbed by the Danes and the Normans, who had made invasions of the country and had formed settlements on the islands about the coast.

The last king who was descended from Kenneth was Malcolm II. He was followed by Duncan, who was killed in 1040 by Macbeth. Malcolm III, known as Malcolm Canmore, the son of Duncan, defeated Macbeth and slew him, in 1057. When England was conquered by the Normans, in 1066, Malcolm took the part of Edgar Atheling, the legitimate ruler, and gave asylum to many of the Anglo-Saxon nobles. He was for this reason involved in long conflicts with William the Conqueror and was at length obliged to submit and do homage for his kingdom. The most noteworthy of the sons of Malcolm was the youngest, David I (1124-1153), who introduced into Scotland feudalism as it was in practice in England. David's grandson and successor, Malcolm IV, was unable to maintain in full the power which David had gained.

William the Lion (1165-1214), by reason of his claims on territory in the northern part of England, came into conflict with Henry II of England, was taken captive at Alnwick in 1174 and received his freedom only on taking the oath of allegiance to the English king. William was followed by his son Alexander, who, taking advantage of the disturbed con-

dition of England under John, invaded that country, was defeated and was compelled to do homage to the English king. Alexander III, by his defeat of the king of Norway, added to the kingdom the Isle of Man and the Hebrides.

After the death of Alexander and that of his granddaughter, Margaret, called the Maiden of Norway, numerous pretenders to the crown arose, among whom the most powerful were John Baliol and Robert Bruce. Edward I, chosen as arbiter between these two claimants, decided in favor of Baliol, who then in turn swore allegiance to the English crown. When Edward made his overlordship too oppressive, Baliol attempted with the help of France to make Scotland independent; but Edward invaded Scotland, and after a victory at Edinburgh he took Baliol to England with him as a prisoner. Scotland was now ruled by an English regent. Resistance under William Wallace was for a time effectual, and a great victory was gained at Stirling in 1297. Eight years later, however, Wallace, deserted by the Scotch nobles, was defeated and taken prisoner. Another popular leader was found in Robert Bruce, who declared himself king of Scotland, as Robert I, and in 1314 completely defeated an English army under Edward II at Bannockburn. For fourteen years from this date, Scotland was practically independent. Robert's son, David II, who succeeded him, was a minor, and new disturbances at once began in Scotland. War broke out with England in 1333, and after the Battle of Halidon Hill (1333) and that of Neville's Cross (1346), the Scottish kings were obliged to do homage to England.

With the accession of Robert II in 1371 began the Stuart dynasty. The kings of this line were for the most part strong and able men, but the fact that many of them came to the throne during their minority allowed the nobles to gain undue prominence. James I (1406-1437), who had been taken prisoner by the English before his father's death, was not allowed to return to Scotland until 1424. He proved, on gaining the authority, to be a man of much strength of character, and he introduced order into his kingdom, put down the nobility and greatly encouraged commerce and industry. James IV (1488-1513) became involved in a war with England on account of his support of the pretender, Perkin Warbeck, but soon concluded a truce, and married, in 1503, the daughter of Henry VII

of England. However, after the accession of Henry VIII to the English throne, James, who had formed an alliance with France, invaded Northumberland, but was defeated and killed at the Battle of Flodden Field.

The king's death plunged the nation into a state of anarchy; his successor, James V, had not yet reached the age of two years. His cousin, the Duke of Albany, was appointed regent, but from an early part of the reign James was almost entirely in the hands of the earl of Angus, who had married the queen dowager and had almost complete control of affairs till 1528, when James, then in his seventeenth year, managed to escape to Stirling, take the government into his own hands and drive Angus into England. His alliance was sought by England, France and Spain, and in 1537 James married the daughter of Francis I. The young queen died a few weeks after her arrival in Scotland, and in the following year James married Mary of Lorraine, daughter of the Duke of Guise. Henry VIII made several attempts to induce James to join the Reformation, but James remained a supporter of the old faith as against the reform doctrines.

The eventful period which followed the accession of Mary was dominated by the Reformation movement and by the questions affecting the union of Scotland and England. A scheme to marry the young queen to Edward, son of Henry VIII, was defeated, and the old league with France was renewed.

James VI, the son of Mary, was but a child, and a succession of regents governed the kingdom. On the death of Elizabeth of England, in 1603, James succeeded to the throne as the nearest heir, through his descent from Margaret, daughter of Henry VII and wife of James IV.

There were seven Scottish Parliaments called by James after his accession, where-in he was represented by a commissioner sitting as president. His chief energies were directed to an attempt to draw England and Scotland into a closer union, by means of harmonizing the laws of the two countries and by establishing episcopacy in Scotland. In furtherance of the latter object he visited Scotland in 1617 for the only time after the union of the crowns. There were many acts passed for promoting trade and commerce, and the nation about this time seems to have been seized with a mania for colonization, as many thousands of the inhabitants

left their native land for the Irish province of Ulster or the more distant shores of Nova Scotia. James died in 1625 and was succeeded by his son, Charles I.

Foreign wars and domestic troubles prevented Charles from visiting Scotland till 1633, when he was crowned at Edinburgh. The church was now entirely governed by the bishops, and civil affairs were managed by the privy council. At the outbreak of the civil war in England, Scotland took the part of the Parliament against the king, the Solemn League and Covenant being entered into between the Scottish Presbyterians and the English Parliament.

After the execution of Charles, in 1649, the Scots proclaimed his son king, under the title of Charles II. The young king was then in Holland, and commissioners were sent over from Scotland to inform him that the governing body was willing to join his cause if he would take the covenant. This Charles agreed to do, and he was invited over to his northern kingdom. He arrived in Scotland, was crowned at Scone in 1651 and immediately marched into England. Cromwell, who had already defeated him once in Scotland, followed, and at Worcester utterly scattered the royalist force and compelled Charles to become a fugitive (September 3, 1651). Cromwell returned to Scotland for a time, and on his departure for England he left Monk to complete the work. Cromwell's death was followed by his son's fall, Monk's march to London at the head of the army and the restoration of Charles II (1660). It soon became apparent that Charles was determined to carry out the favorite scheme of his father and grandfather, of establishing the episcopacy in Scotland. This attempt was violently opposed and led to a cruel persecution, which lasted with more or less severity during the whole of the reign of Charles. Hundreds were executed; others were fined, imprisoned and tortured, and whole tracts of the country were placed under a military despotism of the worst description. Under James II the chief events of Scotland were the rising, defeat and execution of Argyll; the declarations of indulgence by which many of the Presbyterian ministers returned to their charges, and the continued persecution of the strict Covenanters. At the Revolution of 1689, William, James's son-in-law, and Mary restored religious freedom.

The death of William III in 1702 transferred the crowns of the two nations to Queen Anne, sister of Mary. In 1703 the Parliament of Scotland issued a declaration which showed an intention, in case of the death of the queen, to appoint a different sovereign from the English king, and the ill feeling between the two countries grew so strong that English statesmen became convinced that a union was essential for the peace of the two countries. A joint commission was appointed to draw up articles of union in 1706. In the Scottish Parliament the articles encountered a strong opposition, but a majority finally carried the measure in January, 1707. Thenceforth the history of Scotland is identified with that of Great Britain. Scotland furnished its full quota of troops in the World War, and bands of Highland troops in their kilts performed some of the most daring feats of the war. A regiment of Scotch Canadians so impressed themselves upon the foe that they won from the Germans the name "Ladies of Hell." See GREAT BRITAIN, subhead *History*.

Related Articles. Consult the following titles for additional information

CITIES AND TOWNS

Aberdeen	Edinburgh
Ayr	Glasgow
Bannockburn	Gretna Green
Dundee	

HILLS

Ben Nevis	Grampian
Cheviot	

HISTORY

Balliol, John De	James I (England)
Bannockburn	Knox, John
Bruce, Robert	Macbeth
Caledonia	Mary Stuart
Edward I, II and III	Picts
(England)	Wallace, William
England (history)	World War

ISLANDS

Hebrides	Shetland
Orkney	

LAKES

Katrine	Lomond
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RIVERS

Clyde	Solway Firth
Forth	Tay

SCOTLAND YARD, a group of buildings in London, England, long famous as the headquarters of the city police force. It is situated at the southeast corner of Charing Cross and takes its names from a palace formerly reserved for the entertainment of Scottish kings when visitors to London. Since 1891 the police department has occupied buildings on the Thames Embankment, known as the New Scotland Yard. The name occurs prominently in English detective stories.

SCOTT, HUGH LENOX (1853-1934), a retired chief of staff of the United States army. He was born at Danville, Ky. For several years after his graduation from West Point he led expeditions against the Indians. He served successively as adjutant-general of Cuba; governor of the Sulu Archipelago (Philippines), from which islands he abolished slavery; and with the rank of colonel, superintendent and commandant at West Point. In 1913, as brigadier-general, he was placed in command of a brigade of cavalry stationed along the Mexican border. Scott showed great ability in settling difficulties by diplomatic efforts, as was evident in the skill with which he pacified a lawless band of Prute Indians in Utah and in dealing with the Villa faction in Mexico. In 1915 he was advanced to the grade of major-general, and from November, 1914, to September, 1917, was chief of staff. After serving on the United States Commission to Russia, headed by Elihu Root, he was appointed commander of the 78th Division at Camp Dix, N. Y., receiving command in March, 1918.

SCOTT, ROBERT FALCON (1868-1912), a celebrated English naval officer and Antarctic explorer, who shares with Amundsen the honor of having reached the South Pole. He was born at Outlands, Devonport, and was educated at Stubbington House, Fareham. In 1892 he entered the navy and rose in eight years to the rank of commander. In 1901 he led an expedition to the south polar regions, where he remained until 1904. On his return to England he was promoted to the rank of captain in recognition of his achievement. In 1909 he was appointed to command the British Antarctic Expedition, whose object was to make extensive investigations in the polar regions and also to locate the South Pole. Scott and four companions reached the Pole on January 18, 1912, but on his return trip lost their lives from

exposure in a terrific blizzard. The fate of Captain Scott and his companions as recorded in their diaries, will always remain one of the most glorious and most tragic in the history of exploration and discovery. See **SOUTH POLAR EXPLORATION**.



ROBERT F. SCOTT

Grave, at
Dryburgh Abbey

SCOTT, WALTER, Sir (1771-1832), a Scotch poet and novelist to whom is credited the creation of the historical novel. He was born in Edinburgh, entered the high school there in 1779, and in October, 1783, was matriculated at the University of Edinburgh. However, neither at school nor at college did he manifest special ability. At the age of sixteen he began in his father's law office a term as apprentice, and in 1792 became a member of the Scottish bar. In 1797 he married Charlotte M. Charpentier, the daughter of a French refugee. Two years later he was appointed sheriff of Selkirkshire, and in 1806 became a principal clerk of the Court of Session.

Scott, the Poet. Scott's first ventures in literature were a translation of Burger's *Lenore*, and *The Wild Huntsman*, which he published in 1796. Then followed the ballads of *Glenfinlas*, *The Eve of Saint John* and the *Grey Brother*; a translation of Goethe's *Gotz von Berlichingen*; the three volumes of the *Minstrelsy of the Scottish Border*, and an edition of the old metrical romance of *Sir Tristram*. In 1805 he became prominent as an original poet, with the publication of the *Lay of the Last Minstrel*, an extended specimen of the ballad style, which became widely popular. In 1808 he published *Marmion*, another poetic romance, which greatly increased his reputation. In 1810 the *Lady of the Lake* appeared, in which his poetical genius seems to have reached its height. His subsequent poetical productions, *The Vision of Don Roderick*, *Rokeby*, *The Bridal of Triermain* and *The Lord of the Isles*, were not so widely acclaimed.

Scott, the Historical Chronicler. Upon the decline of his popularity as a poet, and realization that Byron was surpassing him in his own field, Scott turned his attention to the prose romance, for which the greater part of his early life had been a preparation. The appearance of *Waverley* in 1814, forms an epoch in modern literature as well as in the life of Scott. This romance was rapidly followed by the series known as *The Waverley Novels*, which comprises such masterpieces of historical fiction as *Ivanhoe*, *Guy Man-*

nering, *The Heart of Midlothian*, *The Bride of Lammermoor*, *The Legend of Montrose*, *The Monastery*, *Kenilworth*, *Quentin Durward* and *The Talisman*. Among these, the novels dealing most intimately with Scottish life are counted among his best.

Scott, Man of Business. The desire to become an extensive landed proprietor and to found a family was always one of Scott's ambitions, and this he began to gratify in 1811 when he purchased a small farm of about 100 acres lying on the south bank of the Tweed. By degrees, as his resources increased, he added farm after farm to his domain, until he had completed the estate to which he gave the name of Abbotsford, the "romance in stone"



SIR WALTER SCOTT

In 1820, when he was made a baronet by George IV, he reached the zenith of his fame and material prosperity. But this prosperity was founded on no solid basis, and the crash came in 1826, when Constable & Co, Edinburgh publishers, were obliged to suspend payment, hopelessly involving Ballantyne & Co, with whom it then appeared that Scott was a partner. The liabilities thus incurred by him amounted to about \$600,000. Although he might have compromised with his creditors, Scott assumed this sum as a personal obligation. He worked like a galley slave to clear off the debt, his novels and historical writings following each other with incredible rapidity. Within two years he was able to pay his creditors \$200,000. *Woodstock*, *The Fair Maid of Perth*, *Anne of Geierstein*, *A Life of Napoleon* (nine volumes), were a few of the works which flowed quickly from his pen between 1826 and 1831.

The strain was too great, however, and in 1830 Scott had an attack of paralysis, from which he never fully recovered. A trip to Italy did him little good, and he returned to Abbotsford to die. He was buried in his family burial aisle, amidst the ruins of Dryburgh Abbey. Some years after his death his debt was entirely liquidated by the sale of copyrights and the constantly-increasing sale of his works.

The biography of Scott written by his son-in-law, John Gibson Lockhart, has become a classic.

SCOTT, WINFIELD (1786-1866), an American soldier who distinguished himself in the War of 1812 and the Mexican War was born near Petersburg, Va. He was educated for the law, and was admitted to the bar, but never practiced. Entering the army, he served with distinction in the War of 1812, won the Battle of Chippewa, and was severely wounded in the Battle of Lundy's Lane. In 1832 and in subsequent years, General Scott was employed in operations against the Indians, and in 1841 was appointed commander in chief of the United States



WINFIELD SCOTT

army. His fame rests chiefly upon his brilliant conduct of the Mexican War, where he gained victories at Cerro Gordo, Contreras, Churubusco, Molino del Rey and Chapultepec. Although he was known as "Old Fuss and Feathers," after his successful entry into the City of Mexico and the conclusion of an advantageous peace, he was hailed as a national hero. He was twice an unsuccessful candidate for the Presidency. At the outbreak of the Civil War Scott remained true to the Federal government, but his infirmities rendered him unable to take actual command. He retired from active service five years before his death.

SCOTTI, shot's, ANTONIO (1866-1936), an Italian basso in the front rank of operatic stars, was born in Naples. He made his operatic debut at Malta in the rôle of Amonasro in *Aida*, at the age of twenty-three. In 1899 he made his initial appearance in the Metropolitan Opera House, New York, and then became a member of the Metropolitan Opera Company, essaying leading rôles in *Faust*, *Othello*, *La Tosca* and *Il Pagliacci*, but achieving greatest triumph in Mozart's *Don Giovanni*. Beginning in 1921 he toured the country with a company of Metropolitan stars at the close of the season in New York. He retired in 1933.

SCOURING RUSH. See HORSETAIL RUSH.

SCRANTON, PA., the third city of the state in size and the county seat of Lackawanna County; it is situated on the Lackawanna River, 162 miles north of Philadelphia and 145 miles northwest of New York, on the Lackawanna & Wyoming Valley, Delaware, Lackawanna & Western, the Central Railroad of New Jersey, the Delaware & Hudson, the Erie, and the New York, Ontario & Western railroads. Extensive electric railways reach 18 municipalities and maintain 14 freight stations in the city and district, which are served also by three large bus companies. The airport is at Schultsville.

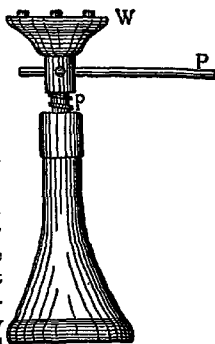
The chief public buildings are a post-office, a city hall, a courthouse, the Albright Memorial Library, a Y.M.C.A. building, a Masonic Temple, a Board of Trade, and a museum of natural history. There is a school for the deaf and dumb; there are two colleges, several private and denominational schools and 140 churches. The International Correspondence Schools have the largest enrollment of any educational institution in the world.

Scranton is the anthracite capital of the world; it contains the largest lace mill in the country. The volume of wholesale and retail business reaches almost \$190,000,000 annually. Industrial plants include blast furnaces, rolling mills, foundries, machine shops, glass works, silk mills, locomotive works and manufactories of knit goods, lace, carpets, buttons, pianos and numerous small articles. There is an extensive trade in miners' supplies.

The first settlement within the present limits of the city was made in 1788; but Scranton was really founded in 1840 by two brothers, Joseph and George Scranton. It was chartered as a city in 1866. Scranton is often called the "Electric City"; here the first electric car on which fares were collected was operated in 1886. The population by the 1930 census was 143,433.

SCREW, a simple machine, consisting of an inclined plane wound around a cylinder. The projecting spiral plane is called the *thread*, while the cylinder forms the *body* of the screw. To show that the thread is formed by an inclined plane, cut a paper triangle with one square corner and a length of at least three times its height. Draw a heavy pencil line along the edge of the slanting side of the triangle; then, beginning at the wide end, roll the paper around a pencil,

taking care to keep the edge of the triangle even with the end of the pencil. The dark line along the slanting side forms the thread of the screw. The distance between the threads is called the *pitch*, or *interval*. In the figure, *W* represents the weight; *P*, the point at which the power is applied, and *p*, the pitch.



To determine the weight that can be raised by a screw with the application of a given power, multiply the power by the circumference of the circle which it describes, and multiply this product by the number indicated by the denominator of a fraction showing the pitch. The circumference of the circle is found by multiplying its diameter by 3.1416. To illustrate: To find the weight which can be raised by a power of 25 pounds, acting upon a lever 3 feet long and attached to a screw having a pitch of $\frac{1}{4}$ of an inch, multiply the diameter of the circle, which is 6 feet, by 3.1416, and multiply this product (18.8496) by 12, to reduce the number to inches. The product equals 226.1952 inches. This number, multiplied by 4, the denominator of the fraction indicating the interval, or pitch equals 904.7808. The power, 25 pounds, multiplied by this number, gives 22,619.52 pounds, the weight that can be lifted. Because of the great power gained by the screw, it is used in raising buildings, in presses, and for holding together parts of machinery, pieces of wood and other articles.

SCREW PINE, or **PANDANUS**, a genus of plants growing in the tropical parts of the eastern hemisphere, which take their name from the spiral arrangement of their long, pineapple-like leaves. In some species, peculiar roots are sent out from various parts of the stem, which upon entering the ground serve as props for the trunk. One Indian species produces flowers, the fragrant buds of which are used for flavoring purposes and as a basis for perfumes; another furnishes strong fibers, from which the natives make sugar bags; and in another species, the tips of the shoots as well as the seeds are edible.

SCRIBE, *skreeb*, AUGUSTIN EUGÈNE (1791-1861), a French dramatist and librettist, born in Paris. His first distinct success was achieved in 1816. From this time on he worked in collaboration with others, and the dramatic pieces ascribed to him, numbering about 400, include all the departments of the lighter drama. Because of their gaiety, plot interest, and the felicitous manner in which their author depicted modern French life, they achieved great popularity over the European continent, and have also been introduced on the American and English stage in the form of translations or adaptations. Two of the best known among them are *Galérie* and *Adrienne Lecouvreur*; he is, however, best known for his libretti, *Fra Diavolo*, *Robert le Diable* and *The Huguenots*.

SCROFULA, a form of tuberculosis in which the neck glands or other lymphatic glands swell, and the tissues become devitalized. Hygienic treatment is the most effective line of cure, with special emphasis on fresh air, nourishing food, tonics and proper clothing. Local treatment of the glands to reduce swelling is also practiced. During the Middle Ages it was believed that scrofula could be cured by the touch of the sovereign, and the disease was known as *king's evil*. It is said that Samuel Johnson was touched by Queen Anne for scrofula when he was a young child.

SCRUPLE, a measure of weight in apothecary's weight, equivalent to 20 grains, $\frac{1}{2}$ part of a drachm, $\frac{1}{16}$ part of an ounce and $\frac{1}{128}$ part of a pound. It is used by pharmacists in compounding medicines.

SCUDDER, *skud'er*, VIDA DUTTON (1861-), a notable American woman who achieved fame as an English scholar. She was born in India, and completed her education at Oxford University, England, and in Paris, after which she joined the faculty of Wellesley College, Massachusetts, as professor of English. She wrote *An Introduction to the Study of English Literature*, once a popular text-book.

SCULPIN, *skul'pin*, a group of small fish of about 250 varying-colored species, found in the northern seas and on the Pacific coast of America. The shape resembles that of the bull-head catfish, and the body is covered with warty projections. Common species are known locally as *miller's thumb*, *Irish lord* and *sea raven*.



SCULPTURE, the art of imitating living forms in solid substances. The word means, strictly, a cutting, or carving, in some hard material, as stone, marble, ivory or wood; but it is also used to express the molding of soft substances, as clay or wax, and the casting of metals or plaster. Three forms of sculpture are usually recognized. When the object stands free, it is said to be *in the round*; when it projects slightly from a solid

surface it is said to be *in relief*; when it is cut into or sunk down into the surface it is said to be *in intaglio*.

A sculptor wields

The chisel, and the stricken marble grows
To beauty.

wrote the poet Bryant in his *Flood of Years*, and in one of Michelangelo's sonnets the artist speaks of the unhewn stone becoming "a living mould." It is this phase of sculpture that sets it apart from the other arts of design; it is preeminently the art best adapted to the portrayal of the human form, the one that gives "life to the cold marble."

How a Statue Is Made. In most sculpture it is customary for the artist to make for himself an image of life size, fashioned in wet clay. For a head or bust a flat board, set on a high stand, with a piece of wood standing at right angles to it, is used. Lead piping is sometimes employed to raise the height of this piece of wood, and around this structure the clay is roughly built up, a cylindrical mass for the neck and an egg-shaped form for the head. For a full-length figure an "armature" is prepared, consisting of an iron rod through the center, attached to which are other irons, in the case of statues, or lead piping, for statuettes. These are bent to the required positions, the whole, when complete, representing in line the pose and character of the intended figure. Upon and around this framework the figure is first roughly built up with clay, care being taken to add just as much as is requisite and to follow the general form and direction of the muscles. The essential difference between modeling and carving is that in the former

the artist works from within outward, by the addition of material, while in the latter he works from without inward by the taking away of material. The sculptor's work proper generally ends with the completion of the clay model.

The next process is that of casting. Plaster of Paris of the consistency of thick cream is poured over the model, to the depth of from two to three inches, the inner layer being colored. When this is set, the clay is carefully removed, and what is termed a "waste mold" is formed. This is carefully washed and when dry is oiled. Into this mold, plaster of Paris is poured, and when this has set hard, the waste mold is chipped off. The plaster of Paris has taken the place of the clay and formed what is called a "cast." A head is usually cast in halves, and a similar treatment is adopted in the case of complete figures. This is termed "piece molding." Parts which project very much are removed and cast separately, being afterward attached by means of plaster of Paris. The reproduction of this plaster cast in marble or stone is a mechanical operation, usually intrusted to a skilled workman. To aid him he employs a "pointing machine," with which he takes exact measurements. Some sculptors work on the marble after a rough copy of the original is made, and some never touch it, but simply supervise the work. For casting in metal, a plaster mold is first made as already described. Within this is fixed a rudely-formed solid, but removable, mass, called a "core," the space between it and the surface of the mold being filled with the molten metal. Another method for smaller work is used, in which the mold is lined with wax and the core inserted close up to the wax lining. The wax is then melted out and the molten metal poured into the mold to take its place, the core being afterward removed.

History. *Egypt.* It is to Egypt that we must turn for the first signs of a developed form of sculpture. The distinctive characteristics of Egyptian sculpture are colossal size, stability and symmetry, the expression being that of calm repose and solemnity, with a suggestion of the supernatural. A conventional uniformity without life or action reigns everywhere. Most of the sculpture is relief and is defective in perspective and proportion, but the figures have a remarkable dignity and are true to life. The best period of Egyptian sculpture was from 1450

to 1000 B. C. In the British Museum is to be found a splendid collection of Egyptian sculptures, extending from 2000 B. C. to the Mohammedan invasion A. D. 640.

Assyria. The best period of Assyrian sculpture, as a style, is inferior to that of Egypt. Its characteristics are an intense and vigorous spirit of representation, without the least reference to ideal beauty of any kind. As compared with Egyptian work it is more realistic, but less true. It is powerful and energetic, but lacks grandeur; overlaid with detail and ornamentation, it does not attain to the sublime in its repose, nor to beauty in its movement. Persian sculpture (560-331 B. C.) differs but little from Assyrian, and is usually included with it.

Greece. Greek sculpture, in its infancy, is strongly stamped with Oriental character, as may be seen by a careful examination of the reliefs from the temple of Assos, now in the Louvre, and the metopes from Selinus, casts of which are in the British Museum. But from the end of the sixth century B. C., the development of Greek art was rapid and continuous. In the sculptures for the Temple of Aegina, executed about 475 B. C., and now preserved at Munich, the figures of the warriors are no longer of the stiff, conventional type, with attitudes correct but lifeless; there is energy of movement in their action, and they have a living truth of gesture, only to be gained by artists who had studied the human form long and attentively. Upheld on the one hand by a noble mythology, that magnified, without distorting, human attributes, and supported on the other by an increasing knowledge of nature, the ultimate perfection of Greek art became only a question of time. It came to perfection in Phidias, whose statues of Athene, in the Parthenon at Athens (438 B. C.), and of Zeus, in the temple at Olympia, mark the period of the highest style of Greek art.

Other sculptors of this period were Myron, famed for his *Discobolus* (*Discus Thrower*), and Polykletus, a close rival of Phidias. The special character of the art that flourished at Athens under the rule of Pericles (fourth century B. C.) consists in a perfect balance and combination of elements sublime and human. Sculpture had reached that point when a faultless imitation of nature was within its reach, but it had not yet abandoned its spiritual connection with a splendid mythology. We have, therefore, in the sculpture

of this period, the highest type of human beauty, joined to a godlike calm and reticence of motion. Examples of the grand style of this epoch are the sculptures of the



THE "DISCUS THROWER"

Parthenon and the Nike Apteros Temple, on the Acropolis; the colossal bronze head of Artemis, in the British Museum; the Venus of Milo, in the Louvre, and the exquisite relief representing the parting of Orpheus and Eurydice, in the museum at Naples

Greek art, however, rapidly moved toward a still closer imitation of actual human life. The people, after the Peloponnesian War, spoiled by the luxury and pleasures which the prosperity of the Age of Pericles had opened to them, were not satisfied with the severe forms of the older masters. The sculptors now cultivated the soft, the graceful and the flowing and aimed at an expression of stronger passion, and they began to be fascinated by the force and variety of human feeling, as well as by the beauty of the human form. Jupiter, Juno and Minerva, favorite subjects of the Phidian Era, were exchanged for Venus, Bacchus and Amor. The representatives of this latter style were Scopas, his younger contemporary, Praxiteles, and Lysippus. The most important works of Scopas that survive are the dec-

orations of the mausoleum at Halicarnassus, erected by Artemisia over the remains of her husband Mausolus, Prince of Caria, 352 B. C. These sculptured decorations, now in the British Museum, present in the designs for the frieze, depicting a battle between Greeks and Amazons, an invention of graceful and energetic movement and a record of rapid and violent gesture such as clearly distinguish the work from that which it succeeded.

To Scopas is attributed the original of the *Venus de Milo*, the splendid copy of which now graces the Louvre. When an ancient Greek sculptor really believed in his gods and in the beautiful myths told regarding them, there must have come to him when making statues of them an inspiration which could come from no other task. Such an inspiration must have come to the unknown sculptor who carved the statue found in 1820 on the island of Melos, in the Aegean Sea, and so called the *Venus de Milo*. In the opinion of the critics there is nothing in



VENUS DE MILO

sculpture which surpasses this wonderful statue. The body and the draperies are bat-

tered, and both arms are gone, so that no one can be absolutely certain as to just what the position of the goddess was; but the nobleness of the ideal portrayed, the lines of the figure and the youthful beauty and majesty of the face make this Venus the chief glory of the Louvre, where so many priceless art treasures are gathered. The most plausible idea as to the position of the god-



APOLLO BELVEDERE

dess is the one which suggests that her left foot rested on a helmet and that a shield was supported on her left thigh.

The works of Praxiteles are especially valuable as expressing a tenderness of feeling which this new and closer sympathy with human emotion had developed. He is known to us chiefly through copies of his works, or of the works of his school, the most celebrated of which are preserved in the Vatican; but the sweetness and delicate grace of his style are admirably displayed in the statue of Ceres discovered at Cnidus, now in the British Museum. Lysippus represented the human form and athletic power in the highest perfection. From the death of Alexander the Great, 323 B. C., onward to the conquest of the Romans. 146 P. C., the progress

of Greek sculpture is only a further, and often a weaker, development of the same ideal. The celebrated group of the *Laocoon*, the head of the *Dying Alexander*, the *Dying Gladiator* and *Apollo Belvedere* are some of the works of this epoch that are preserved to us.

The *Apollo Belvedere* is so called from the Belvedere court of the Vatican, in which it now stands. This figure of the youthful god shows him as marvelously beautiful, yet the face expresses a divine wrath, which makes us feel certain that, with his bow in his outstretched hand, he is about to right some wrong or punish some evildoer. The statue loses none of its beauty for us because we know that what was long thought to be a Greek original is only a skilful Roman copy, or because the left hand and right forearm, which had been broken off, were restored by a sculptor in the time of Michelangelo. Notice the wonderfully graceful yet strong pose of the figure, the beautiful fall of the drapery, and the motion expressed in the whole composition. Although nothing definite can be determined as to the time of its production and the artist, the *Laocoon* was probably produced in the second century B. C. Vergil tells the story



LAOCOÖN

which this group illustrates—how Laocöon, priest of Apollo in Troy, warned the Trojans

against receiving into the city the wooden horse left by the Greeks, and how Apollo, to punish him, sent two huge serpents who attacked the priest and his two sons. The artist who made this statue has chosen to portray the moment of fiercest struggle, and thus there is something horrible about it. But the figures are so accurate anatomically, the passion and the pain shown on the faces and in the straining muscles are so real, that the group must rank with the great works of art of antiquity which have come down to us. No less a critic than Goethe held that the older son, the one to the left of the father, is not in pain, but is simply horrified at what he sees his father and his brother suffering, and that he is about to push off the coils of the serpent and stand free.

Between 1863 and 1867 French archaeologists were exploring the site of an ancient town on the island of Samothrace, in the Aegean. They found various objects of interest, but the greatest find of all was the statue which is called the *Nike*, or *Winged Victory*, of Samothrace, which is now in the Louvre. This statue is in a sadly mutilated condition; the head is gone, the arms are gone, the drapery is chipped. And yet it ranks with the *Venus de Milo*, and other of the most beautiful and famous works of art. Study the sketch of the statue given here. Even in this form there is enough to make clear to us the reason for its ranking by the critics. Notice the wonderful poise; the lift of the wings, the sweep of the draperies. It gives one a feeling of lightness, almost of the ability to fly, just to look at it. Nike, or Victoria, as the Romans called her, was the goddess of victory, and this statue was set up by the Greek ruler Demetrius in 306 B. C., after he had defeated the king of Egypt in battle.

After the time of the great sculptor Praxiteles a group of sculptors grew up, who, from the type of subjects in which they delighted, were known as the Pathetic School. The *Laocoon* was a product of this school, as was also another famous statue which is preserved in Florence, and which is probably the work of a pupil of Praxiteles. This is the *Niobe and Her Children*. Niobe was the wife of the king of Thebes and the mother of six beautiful daughters and six handsome sons, of whom she was very proud. In her pride she boasted that she was superior to

Leto, the mother of Apollo and Diana, who had but the two children. Moved to wrath, Apollo and Diana let fly their arrows at the children of Niobe and killed them one after



WINGED VICTORY

another. Finally only the youngest daughter remained. The statue shows Niobe in an agony of grief, trying to shield this last child from death. The story goes that she was unsuccessful, and that Jupiter, in pity for her grief, changed her into a stone which shed tears.

Italy. The history of sculpture in Italy is only a continuance of its story in Greece. It was Greek art, produced by Greek workmen that adorned the palaces of the emperors; and the Roman sculptors, in so far as they had any independent existence, can only claim to have impoverished the ideal they received from Greece. Many of the best-known statues in existence were produced in the Graeco-Roman period; such are the *Borghese Gladiator*, in the Louvre, the *Venus de Medici*, at Florence, and the *Farnese Hercules*, at Naples. From the time of Hadrian (A. D. 138), art rapidly declined, and this debased Roman was the only style employed in Italy

until the revival in the twelfth century. With the general awakening which began in Italy and spread over Europe, came a revival of sculpture, as of all other arts. The stiff, conventional figures of the Middle Ages were invigorated by the spirit of activity which marked the new movement. This revival of sculpture began with Nicola Pisano, who was born at Pisa about 1206 and whose work is preserved in the pulpits which he carved at Pisa and Siena.

He was followed by his son Giovanni Pisano (died 1320), whose great work is the allegorical group in the Campo Santo of Pisa; but both of these sculptors worked on classic lines. Jacopo della Quercia (1374-1438), whose beautiful reliefs, adorning the façade of the church of San Petronio at Bologna, show a feeling for grace not before expressed, was, in a certain sense, the founder of the modern school. Lorenzo Ghiberti (1381-1455) developed a more pictorial style with extraordinary success; but sculpture awaited the advent of Donatello (1386-1468) to find its true direction and to reach its full triumph. Luca della Robbia (1400-1481) and Andrea Verrocchio (1435-1488), the master of Leonardo da Vinci, may also be named. The special tendencies of Italian sculpture may be said to have reached their full expression in the work of Michelangelo (1475-1564). Here all previous efforts to interpret passion and feeling were summed up and concluded. It was toward a complete understanding of the resources of physical expression that all Italian art had been tending, and it is only more fully exhibited in Michelangelo because he was the greatest master that Italy produced. The chief characteristic of his style was the use of colossal, highly developed forms, combined with intense dramatic action. His works are the statues in the chapel of the Medici at Florence, the *Captives*, in the Louvre, the colossal *David*, at Florence, the *Moses*, in Rome, and the *Madonna*, in Bruges.

For a long period after Michelangelo Italian sculptors were content to imitate and sometimes to exaggerate his manner. The only immediate successor of Michelangelo worthy of note is Cellini (1500-1571), of Florence. Lorenzo Bernini (1598-1680), the master of the "barocco" style, exemplifies a straining after grace and elegance by means of affectation. In the eighteenth cen-

tury Italy became the headquarters of the classical revival which spread thence throughout Europe. The leading spirit in this movement was Canova (1757-1822), who, although he failed to restore to his art its earlier masculine strength, at least sought in the study of the antique for greater simplicity and elegance in representation. Canova's most finished productions are notable for an affectionate tenderness of sentiment, rather than imagination, and his figures are never formed after the highest ideal. His most characteristic works are the *Graces*, *Hebe* and the *Cupid and Psyche*; his finest work is the colossal group of *Theseus Slaying a Centaur*, at Vienna. Canova formed Thorwaldsen (1770-1844), the great Danish sculptor, and his name and influence dominated the art of sculpture throughout Europe for many years. Modern Italian sculpture has leaned toward realism, the leading representatives being Gallori, Magni and Ximenes, and of those who avoided this tendency, the best-known are Consani, Albani and Fedi. Further reference to Italian art appears in the article ITALY.

France. The early art of France was influenced by the styles prevailing at that time. Thus the sculptures of French cathedrals show Byzantine, Romanesque and Gothic influences, the finest examples in the last being at Amiens. Awakening in the fifteenth century, it produced, as forerunners of the Renaissance, Bouteillier and Colombe (1431-1514), and in the sixteenth century, Jean Goujon (1530-1572), whose best work is the *Fountain of the Innocents* in Paris, and whose *Diana* shows all the faults and beauties of the style. Cousin (1501-1589), Pilon (1515-1590), Pierre Puget (1622-1694), Coysevox (1640-1720) and Girardon (1630-1715) continued the style which, while aiming at elegance and grace, lost simplicity and roundness. The Danish school which produced Thorwaldsen, owes its rise to French influence. Later yet came Houdon (1741-1828), Bosio (1769-1845), Rude (1785-1855), Barye (1795-1875), a sculptor of animals, and Carpeaux (1827-1875), whose chief work, *La Danse*, is in front of the new opera house in Paris. Among recent artists are Saint Marceaux, Frémét, Falguère, Mercié, Dalou, Rodin, Dubois, Bartholdi, Barraix, Bartholomé and Rivière. Among these, Rodin (1840-1917) holds the foremost place.

Germany There was no early school of German sculpture, apart from the general Gothic style of all northern European countries, but with the Renaissance of the fifteenth century arose Adam Krafft (1480-1507) and Peter Vischer, two contemporary sculptors of Nuremberg, and Albert Durer (1471-1528), painter and sculptor. Then came a break until the rise of the modern school, which owes its existence to the influence of Thorwaldsen. The chief names are Dannecker (1758-1841), with his *Ariadne*, and Schadow (1764-1850), with *Girl Tying Her Sandal*. Rauch (1777-1857) was the real founder of the modern German school. His monument to Frederick the Great, in Berlin, with its many accessory figures, is his finest work, and from his school came Rietschel (1804-1861), Schwanthaler (1802-1848), August Kiss (1802-1865), Bandel (1800-1876) and Drake (1805-1882). Among sculptors of recent fame are Begus, Eberlein, Zumbusch, Kundmann, Weyr, Tilgner, Strasser, Wolff, Hildebrand and Schilling.

England Of examples of sculpture executed before the eighteenth century England possesses very few. Several tombs exist, and some of the cathedrals, notably Wells, Exeter and Lincoln, possess figures executed presumably by Englishmen at an earlier date. It is not, however, until the reign of Charles I that names of artists appear, notably among them being Nicholas Stone (1586-1647) and Grinling Gibbons (1648-1721), who was the first real artist of the English school. Banks (1735-1805) is the father of ideal English sculpture, but he died unappreciated, leaving John Flaxman (1755-1826) to achieve the task of bringing the classical spirit into English art and of founding the school of the nineteenth century. His love for severe simplicity and true form was imbibed in Rome, and it is best seen in his *Shield of Achilles*, in his *Michael Overcoming Satan* and in his *Cephalus and Aurora*. His most famous pupil was Baily (1788-1867), whose *Eve at the Fountain* is much admired. John Gibson (1791-1866), a pupil of Canova, more properly belongs to the Italian than to the English school, his whole artistic life having been passed in Rome. His finest works are *Psyche Borne by Zephyrs*, *Narcissus*, *Hylas Surprised*, now in the National Gallery, and a large relief of *Christ Blessing Children*. His introduction of color in statuary raised

much discussion. Foley (1818-1874), whose chief work is the equestrian statue of General Outram, now at Calcutta, and Patrick Macdowall (1799-1870), with *Love Triumphant*, are the last of the classic school.

The tendency of sculpture in England at the present day is toward a more original and naturalistic treatment. Alfred Stevens (1817-1875) is the author of the finest decorative work in England, the monument of the Duke of Wellington in Saint Paul's. Of late sculptors who have contributed to England's reputation are Boehm, Woolner, Watts, Leighton, Armstead, Simonds, Brock, Thornercroft, Ford, Gilbert, Bates, Franklin, Stark and Pomeroy.

Other Countries The Renaissance began earlier in the Netherlands than in the other northern countries and had its center at Dijon, in Burgundy, where a number of important masters were active, among whom was Claus Sluter. In the seventeenth century the school of Antwerp gained prominence and produced such sculptors as François Duquesnoy (1594-1644) and his pupil Artus Quellinus (1609-1688), who showed Italian influence. The eighteenth century noted a decline of sculpture in the Netherlands. Scandinavia followed the other nations in the general plan of development. The influence of the Netherlands and France was felt in the eighteenth century. The most important names are Sergel (1740-1814), Bystrom (1783-1848) and Bussen (1798-1868). In the nineteenth century, Thorwaldsen (1770-1884), the great Danish sculptor, stands as the chief exponent of the antique tendency in sculpture.

United States The first American sculptors of importance are Greenough (1805-1852), a portrait statue artist of marked achievement; Powers, whose *Greek Slave*, *Il Penseroso* and *Proserpine* are well known; Crawford, who produced *American Revolution* and *Indian Chief*. Of later artists in the same group are Palmer Story, Randolph Rogers, John Rogers, Rinehart and Hosmer. These, with the intensely patriotic Henry Kirke Browne and J. Q. A. Ward, form a school of distinctive American art, noticeable both in theme and execution. Others of less fame are Clevenger, Bartholomew, Meade and Launt Thompson. Since about 1875, American sculpture has been greatly influenced by the French, though some of the more important artists have had Ger-

man and Italian training. Of the German-American group, Keyser, of Baltimore, is the most important. Howard Roberts and Levi Warner were among the first to display the French influence. Of recent fame are Augustus Saint Gaudens and Daniel C. French, both masters of the art, whose works have placed them in the front rank of modern sculptors. Notable among the works of French are the bronze statue of Washington, executed as a gift of American citizens to France, and the "Lincoln" in the Lincoln Memorial. Saint Gaudens' greatest works are the *Shaw Memorial*, on the Boston Common, the bronze equestrian statue of Sherman, at the principal entrance of Central Park, New York, and the Lincoln Statue in Chicago. See illustration, facing article LINCOLN, ABRAHAM.

Frederick MacMonnies, a pupil of Saint Gaudens, achieved honor, both at home and abroad. Herbert Adams, Partridge, Paul Bartlett, Bitter, Niehaus, Rhind, Proctor, Kemys, Barnard, Borghum, Mulligan and Lorado Taft are among those who have reflected credit upon American sculpture within recent years. On the whole, it may be said of American sculpture that it has started along a path which leads to works of permanent value, namely, independent and consistent labor. It does not disregard the classic forms, but it adds to them an individuality and flexibility which well represents the free and vigorous characters of American life. Such buildings as the Library of Congress at Washington and such decorative achievements as the sculpture of recent exhibitions testify both to the demand for good art and the ability of American sculptors to meet that demand.

The Study of Statuary in School. It is much to the advantage of the school to have one or more groups of statuary so placed that they may be seen daily by all the pupils. Excellent casts of the best works of the great masters, both ancient and modern, can be procured at such small cost as to make it possible to procure these works of art wherever a desire for them is awakened.

In giving lessons on statuary the teacher will be aided by the following suggestions:

1. If possible, let the lessons be upon the statue instead of upon a photograph of it. However, it is better to give lessons upon the photographs than not to give them at all.

2. Select the subject with care. Some people object to the nude in art, and if the

lessons are to be successful with all pupils these objections must be heeded. Remember that the actions of children appeal to the pupils, and so far as possible choose subjects containing children.

3. If photos must be used, try to have enough so that you can place a copy in the hands of each member of the class. It will be well to distribute these pictures a day or two before giving the first lesson.

4. A statue requires more study than a picture like that chosen for a picture study lesson. Therefore the statue needs more time upon it.

5. At first select only the most striking features. As the class shows the ability to grasp details they can be introduced.

6. Make the lesson short and usually let several days intervene between succeeding lessons. One or at the most two lessons a week are enough for subjects of this sort.

7. When the study is completed, require the pupils in the older classes to write a description of the statue. Pupils in the primary grades should be called upon to give oral descriptions.

The Sun Vow. *The Sun Vow*, the work of Hermon A. McNeil, is the embodiment of a legend long standing among the American Indians. According to this legend, before a youth could be recognized as a man and be allowed to take his place among the warriors of his tribe, he must shoot an arrow at the sun as a test of his strength and skill. If truly aimed and vigorously sped, the arrow went far out of sight in the sun's rays and the youth was deemed worthy. Otherwise he remained longer with the squaws. The group further represents age about to pass from earth and youth about to enter upon the activities of life. This idea is vividly portrayed in the contrast of the figures of the old chief and the boy.

All children are hero worshipers, and boys especially like the heroic. Therefore the group selected for our study will be of special interest to them.

1. Make a careful study of the group and determine what you wish to bring out in the lessons before presenting the subject in class.

2. Introduce the lesson by telling the legend upon which the work is based. Ask the pupils about such customs of the Indians as are especially related to this legend, such as their weapons of warfare and manner of dress. Bring out the fact that in some tribes children and youths were often unclothed.

3. Notice the perfect muscular development in the youth.

Call attention to the position of the arm and bow. Are these natural?

4. It may lend interest to the study to have some boys make a bow and arrow and let members of the class take turns in shooting.



THE SUN VOW

<p>DEFINITION The art of imitating living forms in solid substances</p> <p>PROCESSES 1 Modeling The use of clay in the fashioning of the image 2 Casting a Plaster of Paris poured over the model. b The plaster of Paris removed, and plaster of Paris poured into the new model c. Reproduction of the plaster cast in marble or stone</p>	<p>Egypt 1 First signs of a developed form of sculpture 2 Characteristics: Colossal size, stability, symmetry, calm repose, solemnity. 3 Best period from 1450-1000 B. C. 4 Characteristics: Intense and vigorous spirit. No reference to any ideal beauty, over-laden with detail and ornamentation.</p> <p>Assyria 1. Persian sculpture (560-331 B. C.) usually included with Assyrian. 2 Development rapid and continuous from end of sixth century B. C. 3 Came to perfection in Phidias in his Athens and Zeus.</p>	<p>Greece 1 Characteristics of the Periclean age A perfect balance and combination of elements sublime and human 2 Sculptures of Parthenon, the Venus of Milo 3 Period of Scopas, Praxiteles, Lysippus Soft graceful forms Venus, Bacchus, Amor 4 From 322-146 B. C. Dying Gladiator, Apollo Belvedere 1 A continuance of Grecian sculpture Decline 2 The revival came in twelfth century with Nicola Pisano, and came to its triumph in Donatello 3 Reached its full expression in Michelangelo, who summed up and concluded previous efforts to interpret passion and feeling. 4 Modern sculpture tends to realism.</p>	<p>Italy 1 Early art expresses Byzantine, Romanesque and Gothic influences. 2 From fifteenth to eighteenth century Botticelli, Colombe, Goujon, Cousin, Filon, Puget. 3 Eighteenth and nineteenth centuries produced Houdon, Basso, Rodin, Barye, Carpeaux 4 Recent artists Saint Marcereau, Frémier, Daion, Dubois, Bartholdi, Rivero</p>	<p>France 1 The Renaissance produced Kraft, Vischer, Dürer 2 Influence of Thorwaldsen originated the modern school, but the real founder was Rauch. From his school came Ritzschel, Schwanthaler, Kiss, Baudel, Drake 3 Of recent fame Reges, Eberfeld, Zumbusch, Hildebrand, Schilling.</p>	<p>Germany 1 Few examples before eighteenth century 2 Gibbons, the first real artist of the English school 3 Bunter, the father of ideal English sculpture, but the school of the nineteenth century was founded by Flaxman 4 Foley and Macdonald the last names of the classic school. 5 Present tendency toward originality and naturalism.</p>	<p>England 1 First sculptors of importance Greenough, Crawford, Palmer, Story, Rogers, Rinchart, Hosmer, Browne, Ward 2 Since 1875 American sculpture influenced by the French Howard Roberts, Levi Warner. 3 Of most recent fame. Augustus Saint Gaudens, Daniel C French Also, MacMonnies, Adams, Partridge, Bartlett, Butler, Nicholas, Rhind, Proctor, Kemys, Barnard.</p>	<p>United States</p>
<p>SCULPTURE</p>	<p>FORMS 1 When the object stands free it is said to be in the round 2 Projecting slightly from a solid surface it is in relief 3 When cut into or sunk down into the surface it is in intaglio</p>						

Questions on Sculpture

In what respect does sculpture differ from the other arts of design?

Describe the process of making a statue.

What are the three forms of sculpture?

What are the chief characteristics of Egyptian sculpture? Of Assyrian?

What are the important elements of the art that flourished in Athens during the rule of Pericles?

How did Grecian art change after the Peloponnesian War?

Why is the *Venus de Milo* a masterpiece? Where and when was it discovered?

What great works of art are in the Louvre?

Upon what story is the *Laocoon* based?

What is the story of Niobe, and how has it been portrayed in art?

What are the chief qualities in the work of Michelangelo?

Who was the leading spirit in the classic revival in Italy?

What great sculptors have France and Germany produced?

What did John Flaxman do for English sculpture?

For what is the Danish sculptor Thorwaldsen noted?

What great works has Augustus Saint Gaudens produced?

What suggestions can you give in regard to the study of statuary in schools?

the arrow into the air. Have the other members of the class compare the position of the one shooting with that of the one in the statue

5 Contrast the angular figure of the old chief with the beautiful muscular figure of the youth.

6. Again contrast the expression of calm resignation of the old man with that of eager expectancy on the countenance of the youth. Does the old man want the boy to succeed? What does failure mean to the boy?

Bringing out these contrasts will reveal the remarkable delicacy and skill of the sculptor as well as the thorough knowledge of his subject. It is given to but few to work clay, marble or bronze so delicately as to portray accurately the thoughts and feelings indicated by the countenances in this group.

Call the attention of the older members of the class to the composition. Notice how perfectly the group is balanced. Notice how natural is the position of each figure, and especially the lifelike appearance of the group as a whole. Lead the pupils to see that these characteristics, together with the contrasts to which attention is called above, make this group not only an object of beauty, but a work of the highest art as well.

Related Articles. Consult the following titles for additional information

GENERAL

Alto-Relievo	Cast	Mezzo-Relievo
Bas-Relief	Colossus	Parthenon
Bust	Elgin Marbles	Sphinx
Carving	Liberty, Statue of	

SCULPTORS

Barnard, George	Grey-Phidias
Bartlett, Paul	Way-Powers, Hiram
land	Praxiteles
Borglum, Gutzon	Robbia, Della
Canova, Antonio	Rodin, Auguste
Cellini, Benvenuto	Rogers, John
Crawford, Thomas	Rogers, Randolph
Donatello	Rude, François
French, Daniel Chester	Saint Gaudens, Augustus
Ghiberti, Lorenzo	Schilling, Johann
Hosmer, Harriet	Stoss, Veit
Houdon, Jean Antoine	Taft, Lorado
Leighton, Frederick	Thorwaldsen, Bertel
Lysippus	Ward, John Q.
MacMonnies, Frederick	Watts, George Frederick
Michelangelo, Buonarroti	
Partridge, William	
Ordway	

SCURVY, a disease formerly very prevalent among sailors, because of their being compelled on long voyages to live exclusively upon salt meat and hard bread, with impure water. In recent years the disease on ships is little known, because of better sanitary provisions and more abundant supplies of food. It is due to poor nourishment and is rarely seen, except among the poor and careless. Severe cases of scurvy are accompanied by swellings in different parts of the body and by swollen gums, which become ulcerated and bleed, making it almost impossible to eat. In fact, unless suitably treated, it progresses to exhaustion and death.

Treatment consists in a change of diet. Those who eat plenty of vegetables are never troubled with scurvy. Lemon juice is a valuable preventive and is required by law to be a part of the diet of all sailors in the British navy.

SCUTARI, *skooh'tah re*, ALBANIA, a fortified town on the southeastern shore of the Lake of Scutari, situated near the junction of the Drin and Boyana rivers. Before the Balkan Wars the town was the capital of a Turkish vilayet (province), but in 1913 it was captured by the Montenegrins, and by the Treaty of Bucharest was made a part of Albania. In the World War Scutari was

captured by the forces of the central powers, and occupied by them until nearly the close of the war. The town lies on a plain situated about twelve miles from the Adriatic Sea and surrounded on three sides by mountains. In normal years there is a thriving export trade in skins, woolen goods, grain and fish, and cotton manufacture is of considerable importance. Population, estimated, 32,000.

SCYLLA, *sil'ah*, and **CHARYBDIS**, *la rib'dis*, the former, according to a Greek myth, once a beautiful girl transformed into a six-headed monster because of the jealousy of Circe. She lived under a rock opposite Charybdis and was wont to thrust forth her long necks and in each of her mouths seize one of the crew of every passing vessel. The whirlpool Charybdis, almost opposite the entrance to the harbor of Messina, in Sicily, engulfed every passing vessel when the tide was rushing in. The term, "between Scylla and Charybdis," indicating the difficulty of steering between rock and whirlpool, in modern phraseology has come to mean one of two dangers or evils which must be met.

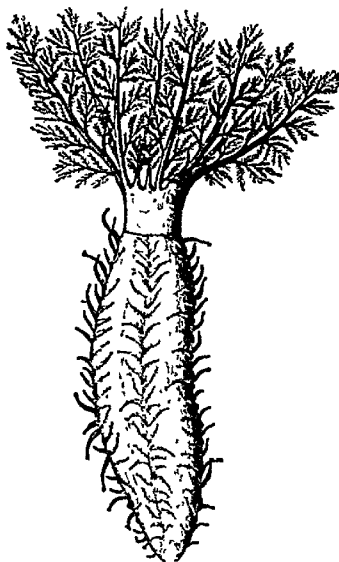
SEA. See OCEAN.

SEA ANEMONE, *a nem'o ne*, the popular name of a number of sea animals somewhat resembling flowers, from which they derive their name. They are the second lowest among the divisions in the animal kingdom, and with the jellyfish and corals are classed in the branch *Cocenterata* (which see). Sea anemones differ somewhat in size and form, but in general all appear as fleshy cylinders, attached by their bases to rocks or stones, and presenting at their free extremities mouths surrounded by circlets of arms or tentacles. With these tentacles, in some cases exceeding two hundred in number, they seize their food, consisting of a small variety of sea animals, which they paralyze by means of stinging cells, common to this branch of the animal kingdom. The appearance of anemones with their tentacles extended is very beautiful, as they are of all varieties in color and have the appearance of fully-expanded flowers, which, however, close suddenly when touched in any way. Although sea anemones are attached to rocks, they are able to detach themselves and move about at will.

SEA COW. See MANATEE.

SEA CU'CUMBERS, or **HOLOTHURIA**, *hal'o thu'ri a*, the name of a group of

sea animals, belonging to the same branch as starfishes, sea urchins and sea lilies. They are covered with a tough, leathery skin which is perforated with holes,



SEA CUCUMBER

through which the foot-tentacles protrude (see ECHINODERMS). The animals are capable of contracting and extending themselves to several times their ordinary length, and they will reproduce to an extraordinary degree parts of the body which are cut away or destroyed. They abound along the eastern coast of Asia, and some species are edible. See TREPANG.

SEA HORSE. See HIPPOCAMPUS.

SEA ISLANDS, the small islands which gave their name to a fine variety of cotton called sea-island cotton (referred to in the article COTTON). They are located off the coast of South Carolina, between Charleston and Savannah, are near the shore and separated from it by narrow lagoons. Besides cotton, the islands are well adapted to the cultivation of rice.

SEA KALE, also called **CHAMBE**, is a perennial plant of the Cruciferae family (which see), important as a food on the Atlantic coast of European countries. Its sprouts are blanched and are eaten like asparagus. It is propagated by cuttings or offsets.



SEAL, a warm-blooded, air-breathing, animal that lives both in the water and on the land. A few seals are found in the Caspian Sea and Lake Baikal, but, with these exceptions, all seals are inhabitants of the sea. They are divided into two classes, called *true seals*, which have no external ears, and *eared seals*.

General Description.

The seal has a body which is large at the front and tapers toward the tail, like that of the whales. It

has four legs, which are almost covered by the skin of the body, while in place of the feet are fins or flippers. The hind legs are used in swimming, and the fore legs support the animal in an erect position when he is on the land. The mouth is large and is surrounded by numerous feelers, resembling those of the cat. The eyes are large, with an almost human expression, and the ears are small or entirely lacking. The body is covered by thick, woolly fur and long, shining hair, and all is so oily and smooth that it enables the seal to move easily through the water. Seals are air-breathing animals, but they can remain under water for a considerable time. They are expert divers and swimmers, but are exceedingly awkward on land.

Where Seals Live. Seals inhabit the cool waters of the temperate and polar regions and usually return to the same spot year after year to breed. They live in herds, and before they were hunted many of these herds were of enormous size. They frequent rocky spots along the seashore, where they come at breeding time and remain to rear their young. The locations chosen are in isolated regions, far from sections that give evidence of having been the homes of men. In such security communities of thousands are found.

Sealing. The hair seal, which is the common seal of the Atlantic coast, has long, silky hair, and is valuable for its skin and fat, called *blubber*. It is captured in large numbers off Newfoundland, Labrador, Jan Meyen Island and in the White Sea. The inhabitants of Greenland hunt these seals for food and clothing, but they take only a

sufficient number to supply their needs. In many places these seals have been nearly exterminated by hunters, because the skins make good leather, and a valuable oil is extracted from the blubber. The hair-seal industry is really more important than the fur-seal industry, although it has not received as much attention. Finally the danger of exterminating these animals became so imminent that by international agreement the sealing season was restricted, and now about 250,000 seals are taken annually. Under these restrictions the herds have been able to increase in size.

Fur Seal. The fur seal or *sea bear* is highly valued for its fur, which consists of a thick, woolly hair next the skin, very fine and compact, usually of a dark brown color. Over this grows long, coarse hair, which is of some shade of gray. The fur seals are found in the water of the cool temperate or polar regions north and south of the equator, though in the Antarctic regions they are almost extinct.

One herd of seals, which constitutes a distinct species, and that the most important of all the seals, makes its home on the Pribilof Islands, a barren little group in Bering Sea. The study of these animals and their habits, as exhibited on Saint Paul and Saint George,



FUR SEAL

the two largest islands, has been as fascinating to men of science as their capture has been profitable to traders. Every spring

the seals return by thousands to this chosen home, and many of them have specially favored places which they seize each year, and for which they will fight to the death. Each old male, or bull, gathers about him a large number of females, sometimes as many as one hundred, whom he defends against the other bulls, and from whom he exacts the strictest obedience. Through all the long period from spring until August the bulls fast, but the mothers, soon after the young seals, or pups, are born, swim away to the south to find food. The little seals are thus left sometimes for a week, but when the mothers return each is able to distinguish her own pup from all the others of the great group. The pup, too, can tell its own mother's voice, though hundreds or thousands of others may be calling at the same time.

When winter comes, and the storms begin, the seals depart for the south, often going down as far as Lower California, but nowhere do they land and establish a home until with the spring they return to the Pribilof Islands.

The full-grown male fur seal is almost as large as a bear, being often twice as long and weighing four or five times as much as the female. It is the young males which are killed for their fur, for they are the least necessary part of the colony, as the old bulls will not allow them to set up families until they are seven or eight years old, at least. The killing of seals on the Pribilof Islands is carefully regulated by treaty signed by the United States, Canada, and Japan, to preserve the herd from extinction. The Pribilof seals were reduced two-thirds in number, but under treaty restrictions have increased nearly to their old-time numbers. There are other seal breeding grounds, or rookeries, on other groups of islands, but none are as large or as important as the one on the Pribilof Islands.

The animals are killed by clubbing them when they are on land, where they are comparatively helpless. The skins are salted and packed in the holds of vessels until the close of the season. The beautiful fur is seldom seen in its natural state. As usually prepared, the long gray hair is removed by scraping the pelt on the under side until the roots of this hair, which penetrate the skin farther than those of the fine hair, are cut; then by whipping the pelt the long hair is

easily removed. The skins are then dyed dark brown or almost black, and in this form constitute the ordinary sealskin of commerce. See ELEPHANT SEAL; SEA LION.

SEAL, a sign or mark, but usually an engraved stamp bearing a device or inscription, impressed on paper, metal or wax, and attached to important documents. The seal of country or state must be attached to legislative acts before they can go into effect.

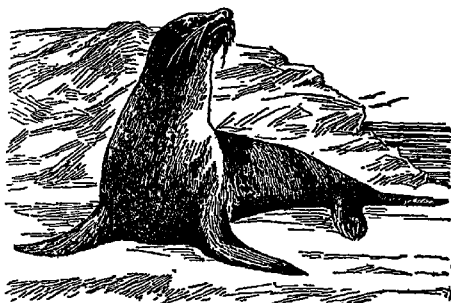
GREAT SEAL OF THE UNITED STATES This was first adopted by Congress in 1782, and the design was ordered changed in 1885 (see page 3692). On the obverse side is an eagle typifying the government. In one claw the eagle clutches an olive branch and in the other arrows, typifying power in both peace and war. A constellation above denotes the thirteen original states. The motto, "E pluribus unum," signifies unity, and the escutcheon borne unsupported on the breast of the eagle signifies virtue and honor. The reverse side of the seal shows a pyramid, signifying strength. Above is an eye and the motto, "Annuit coeptis," signifying providential direction; below are the date (1776) and the motto, "Novus ordo seclorum," signifying the beginning of the American Era.

SEA LILIES. See CRINOIDEA.

SEALING WAX, a resinous preparation used for securing folded papers and envelopes and for receiving impressions of seals set to instruments. Ordinary red sealing wax is made from shellac melted with rosin, to which are added Venice turpentine and vermilion. Inferior qualities consist of a proportion of common resin and red lead and black; other colors are produced by substituting appropriate pigments. The invention of sealing wax is credited to the Chinese in the seventh century.

SEA LION, the name given to a large group of eared seals, which, though closely related to the fur seals, are not of value as fur producers. All have long, cylindrical bodies, small, round heads, pointed noses, thick skin, with an under layer of fat for protection against cold, and coarse hair. The individuals of some species have manes. The largest animals, belonging to the Steller group, attain a weight of a thousand pounds and more, and a length of fourteen feet. Their particular habitat is the Northern Pacific. The natives of the Aleutian Islands catch thousands of these seals. They use the flesh for food, the hide for shoes and

boats and the sinews for thread. Another group, called California sea lions, is made up of smaller animals. Sea lions are seen



SEA LION

in large numbers on the Pacific coast cliffs. They are peaceable creatures, but if attacked defend themselves fiercely. They are protected by law, but a few are allowed to be taken for menageries and zoological gardens.

SEARCH, RIGHT OF, in international law, the right claimed by a nation at war to authorize the commanders of its lawfully commissioned cruisers to enter and search private merchant vessels of neutral nations on the high seas for the purpose of examining their papers and cargo and to search for enemy property or contraband of war. It is also the right claimed by a nation to search vessels of other nations in order to seize citizens of the former in the service of the latter. England's insistence on the right of search was one of the causes leading to the War of 1812.

SEARCH WARRANT. See **WARRANT**.

SEA ROBIN. See **GURNARD**.

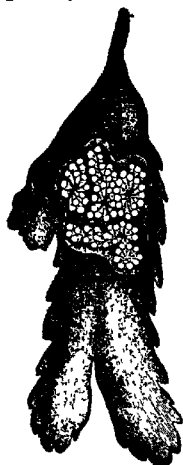
SEA SERPENT, a marine monster, often reported as having been seen, although there is no proof that such a creature exists. Various accounts assert that it is sixty feet or more in length and that it swims with its head and part of its body above water. However, this is generally regarded as a myth, and the explanation is that people have been deluded by the sight of shoals of fish, or logs of wood or seaweed.

SEA-SICKNESS, a nervous attack, produced by the motion of the sea. The symptoms are headache, nausea, vomiting, general weakness and sometimes extreme depression. Usually an attack passes off quickly, as the person becomes accustomed to the sea, and will not recur, at least during the

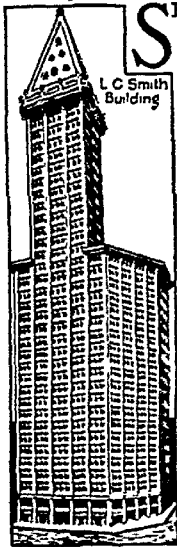
continuance of the voyage. Some persons are always more or less ill when on the water and become violently so when the sea is rough. Children and aged persons are more frequently exempt than others. Many remedies have been suggested for seasickness, but none seems to be effective in all cases. One should not overload the stomach and should take active exercise in the open air. If, however, the attack is severe, the patient should go to bed for a day or two. However, long confinement in a stateroom is bad, and it very often happens that the attacks will disappear entirely if the patient seeks the open air.

SEASONS, *se's'nz*, the four periods into which the year is divided by the ever-changing position of the earth in relation to the sun. As the earth revolves about the sun in a nearly circular orbit, its axis at all times points toward the Pole Star and is inclined to the plane of its orbit $23\frac{1}{2}^{\circ}$. Therefore different parts of its surface are at different times of the year exposed to the vertical rays of the sun. Astronomically speaking, in the northern hemisphere spring extends from March 21, the time of the vernal equinox, to the summer solstice, June 21; summer from June 21 to September 21, the time of the autumnal equinox; autumn to December 21, and winter from that date to the beginning of spring. In the southern hemisphere the seasons are reversed, and spring begins September 21. In the torrid zone the changes in the seasons are not marked by differences in temperature, but by wet and dry periods. See **EQUINOX**; **SOLSTICE**.

SEA SQUIRTS, *skwurts*, or **ASCIDIAN**S, *as sid'i anz*, a name commonly given to certain low-grade mollusks, so called because of their habit of squirting jets of water when touched or irritated. They somewhat resemble double-necked bottles, and are of leathery or gristly nature. They are found at low water on a

SEA SQUIRTS
Colony on branch of seaweed

sea beach or are dredged from deep water attached to stones, shells, seaweed and fixed objects. There are numerous species, all of which pass through peculiar phases of development. The young sea squirt resembles the tadpole of the frog, and is free-swimming.



S EATTLE, WASH., the "Queen City," the county seat of King County, and the largest city in the Pacific Northwest and the major financial, industrial, commercial and transportation center of the region. It was named after a friendly Indian chieftain. It is the nearest large American city to Alaska and the Orient. It is 196 nautical miles distant from the Pacific Ocean. The site of the city is a beautiful area between Puget Sound on the west and Lake Washington on the east and embraces two large lakes. It is built on a series of hills some of which rise to a height of 300 feet; they

are separated by broad valleys or terraces. The main streets run north and south and the cross streets east and west. Street car and motorbus systems connect all districts with the municipal area. There are 35 miles of boulevards.

The city has 42 parks in addition to 45 squares, circles, triangles and "places"; there are 44 playfields and two municipal golf courses with numerous private and fee courses. All these areas amount to 2,289 acres which are supplemented by 13 picturesque boulevards. There are 12 municipal bathing beaches, four on salt water and eight on fresh water. Seattle has more than 1,000 miles of graded streets, more than 800 miles of paved streets and approximately 1,400 miles of sidewalks. The streets are among the best lighted of any in the world. The water is unsurpassed in purity; the rates for water, electricity and fire insurance are among the lowest in the nation. Seattle is second in percentage of home-ownership among American cities with more than 300,000 population.

Buildings and Institutions. Seattle has

many large structures including the Northern Life Tower, the Exchange Building, the county-city building, the Federal building, the U. S. marine hospital, the Harborview county hospital, the distinctive Metropolitan Center and other structures ranging upward to the 42-story Smith Tower which long was the tallest building west of New York. There are two notable museums, one for art and one for natural history. The civic auditorium covers a ground area of 62,600 square feet. The public library maintains 10 branches and circulates 2,000,000 volumes yearly. There are 10 hospitals and 250 churches.

Education. Seattle is the general educational center of the upper Pacific Coast and the home of the University of Washington, situated on a campus of 582 acres, and of Seattle Pacific College and of the famous Cornish School of the Arts as well as of other notable institutions. The city has 84 grade and special schools, five junior high schools and nine high schools, the attendance approximates 56,000. The Woodland Zoological Garden is a valuable asset.

Climate. Although Seattle is in the same latitude as Newfoundland, the average winter temperature of the city is 41° above zero, with the daily range in the winter months from an average minimum of 37° to an average maximum of 46°. Although surrounding snow-clad mountains are ideal for winter sports, Seattle itself has been known to go through the winter without frost or snow. Golf is played virtually every day on green fairways. Similarly the summer temperature is moderate, with an average of 62°. Over a period of 54 years the annual precipitation which comes mostly in winter and usually at night has averaged 33.44 inches, or less than the average for 38 cities in 38 states. Tornadoes and hurricanes are unknown.

Industries. The region in which the city is located affords one-third of the potential hydroelectric power of the nation. Consequently industries have flourished. Major products include foods, lumber and lumber products, metal and metal products, wearing apparel. Boeing aircraft production is a large item in industry. Exports include tobacco products, cotton, canned salmon, machinery and mill products. Goods from every state in the Union and from every province of Canada pass through Seattle. The whaling industry and the fisheries procure their outfits at Seattle for use on cruises in the

northern Pacific. Likewise the logging camps of the state and of the Northwest generally procure most of their supplies from the city. Fish packing and canning employs many workmen.

Transportation. The harbor is one of the best salt water harbors in the world; by means of the Lake Washington ship canal the lakes have been connected with Puget Sound so that the waterfront measures some 193 miles. The many commercial piers include the largest in the world; the locks in the canal will accommodate 780-foot ships. The largest ocean steamships can reach the city in all seasons of the year. Convenient transportation to all Northwest centers is provided by rail, interurban, motorbus, ferry, steamship and air service. The railroads that touch the city are the Chicago, Milwaukee, Saint Paul & Pacific; the Great Northern; the Northern Pacific; the Pacific Coast; the Union Pacific and the Canadian Pacific (by steamship service). There are two interurban lines, four bus lines and three airports.

History. Settlement of Seattle began in 1852. It was laid out as a town in 1853. Growth was slow until connection was established with the first transcontinental railway in 1884. In 1889 a fire destroyed the main part of the city, with a loss of more than \$10,000,000. Rebuilding was prompt. The discovery of gold in Alaska and subsequent acquisition of the Philippines emphasized this strategic location on the route of commerce and gave marked impetus to growth. The Alaska-Yukon-Pacific Exposition of 1909-1910 celebrated this great development. At one time Seattle was building more ships than any other city in the United States. Population, 1930, 365,583.

SEA UR'CHIN, or **ECHINUS**, *e ki'nus*, a genus of sea animals belonging to the same group as the starfish, sea hly and sea cucumber (see **ECHINODERMS**). The body of the sea urchin is more or less globular and covered with a shell which is often studded with movable spines. Sea urchins, of which there are many species, are found in shallow water in almost all parts of the world, those of the tropical regions being largest.

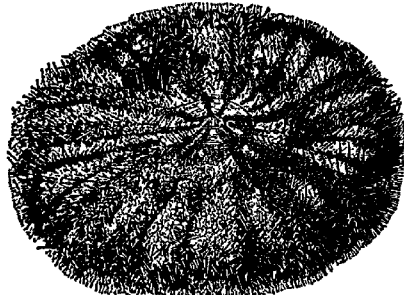
SEA'WEED, the common name for any plant which grows in water. See **ALGÆ**; **KELP**.

SEBASTIAN, *se bas'chan*, **SAINT** (†-288), a Roman soldier and Christian martyr who was put to death by Emperor Diocletian.

His position as captain of the Praetorian Guard gave him the coveted opportunity of spreading Christianity and protecting its adherents. Diocletian, on hearing of this, ordered Sebastian to be tied to a stake and shot with arrows. Irene, a Christian, is said to have taken him to her home and cared for him until his wounds were healed. When Sebastian, after his recovery, accused Diocletian of cruelty, the young soldier was condemned to be beaten to death.

SEBAS'TOPOL, locally **SEVASTOPOL**, a great naval harbor in Russia, on the southwestern extremity of the Crimean peninsula, at the head of a four mile inlet which forms one of the best roadsteads for vessels on the Black Sea. The city occupies a strip of land between two bays at the head of the inlet, on elevated ground. Sebastopol was founded by Catherine II in 1784, and in 1804 it was made a naval base. The place was the scene of a terrible siege in the Crimean war. Population, 1933, 78,300.

SECESSION, *se sesh'un*, in United States



UNDER SURFACE OF SEA URCHIN

history, a term applied to the withdrawal of a state from the Union. The idea of secession appeared at many times during the early years of the republic, and the right of secession was conceded by many. Every important change in policy gave opportunity for the minority party to suggest secession as a means of compelling the party in power to change its course. It was suggested at the Louisiana Purchase, at the War of 1812, at the passage of the tariff of 1828 and at various times during the slavery controversy. In 1860, after the election of Abraham Lincoln as President, secession was actually carried out, eleven Southern states seceding and forming the Confederate States of America. This brought on the War of Secession, or Civil

War, since which the union has been considered inviolable. See CIVIL WAR IN AMERICA; CONFEDERATE STATES OF AMERICA, UNITED STATES, subhead *History*.

SECORD, LAURA, a Canadian heroine During the War of 1812 a force of Americans sought to surprise a small British force at Beaver Dam. News of this plan reached James Secord, a wounded militia officer then living in Queenstown.

As he himself was unable to warn the British commander, his wife undertook the dangerous mission. Driving a cow before her until she reached the woods, in order that the enemy might not suspect her purpose, she then set out on her solitary tramp of twenty miles through the dense forest. After an exhausting day, during which she was in constant danger from hostile Indians and Americans, she brought the news to the defenders of Beaver Dam. The British forces were now prepared for attack and when the Americans approached, the English immediately took the offensive and forced the Americans to surrender. While the battle in itself was not of great significance, it will live in history because of her heroism



THE LAURA SECORD MONUMENT, AT LUNDY'S LANE CEMETERY

SECRETARY OF STATE. See STATE, DEPARTMENT OF.

SECRETION, in animal physiology, the separation of certain substances from the blood and the forming of them into special fluids, such as bile, saliva, mucus. Secretion is the work of organs of various form and structure, but all may be classified as membranes or glands. Secretions are of two kinds, those that have a special work to do, known as *true secretions*, as the saliva and bile; and those that are discharged from the body as worthless or harmful, known as *excretions*. The latter require no special cells, as they exist in the blood and must be separated from it. If an excretory organ becomes useless, some other organ will do its work, but if an organ of secretion be removed, its product is no longer found in the system. See GLANDS; MEMBRANES.

SECRET SERVICE, that branch of the government whose duty it is to detect criminal and fraudulent practices against the government. In most foreign governments this service is in the hands of a separate department, but in the United States each of the several executive departments has its own secret service. The most important divisions are those connected with the Treasury and the Department of Justice. The Treasury division is engaged chiefly in the detecting and arresting of coin and note counterfeiters and in preventing the violation of revenue laws.

The duties of the division connected with the Department of Justice consist in detecting plots against the government, and in discovering and arresting those who persist in violating the laws of the United States in other ways than by defrauding the government financially. This division, called the Federal Bureau of Investigation, was given additional powers in 1933 in cases of kidnapping and other serious crimes to cross state lines in pursuit of suspects. The bureau is acknowledged to be the most efficient detective force that was ever assembled in America.

SECRET SOCIETIES. See FRATERNAL SOCIETIES.

SECURITIES AND EXCHANGE COMMISSION, a semi-judicial body authorized by the Congress of the United States in 1934 to regulate the practices of stock exchanges throughout the country. The Commission comprises five men, appointed by the President, with Senate approval, the salary of each is \$10,000 per year. It is the duty of the Commission to register all stock exchanges, except that small ones may be exempted. Each exchange pays a yearly fee; each must open all records and correspondence to the Commission. If irregularities are discovered, power is given to discipline guilty members or entirely suspend trading. The Securities and Exchange Act provides that in trading no margins below 45 per cent of the value of the stocks involved shall be accepted. All issues of new securities must be registered with the Commission, except those of public bodies, misleading statements in connection with registration are strictly forbidden.

SEDALIA, Mo., the county seat of Pettis County, 100 miles east of Kansas City, on the Missouri, Kansas & Texas and the Mis-

souri Pacific railroads. The city is situated on a plain almost a thousand feet above sea level, in an agricultural region containing, also, deposits of zinc, iron, lead, fire clay, emery and limestone. Repair shops of both of the railroads are located here, these employ nearly 2,000 men. There are also foundries, machine shops, implement works, woolen mills, a meat-packing plant, flour mills, grain elevators, broom factories, a clothing factory and manufactories of agricultural implements. The principal structures are a Federal building, courthouse, high school, municipal buildings, a Y. M. C. A., a Carnegie Library, a railroad hospital and two that are private. The city has a telegraph school, George R. Smith College for colored students, a convent and other institutions. The city was laid out by General George R. Smith in 1861, and was a military post during the Civil War. It was incorporated in 1864, and was chartered as a city in 1889. Population, 1920, 21,144; in 1930, 20,806.

SEDAN, *se dahn'* BATTLE OF, the decisive battle of the Franco-German War, fought September 1, 1870, at Sedan, a fortified town 164 miles northeast of Paris. Marshal MacMahon, on his way to relieve Bazaine at Metz, was forced by the Germans to take refuge in the fortress of Sedan, which was then surrounded by the enemy. The French issued from their position and began battle; driven back to the town of Sedan, after gallant fighting they were finally forced to surrender. Emperor Napoleon III and over 85,000 men were made prisoners. It was the capture of Sedan which led to the overthrow of the Second Empire in France. See FRANCE, subhead *History*; FRANCO-GERMAN WAR.

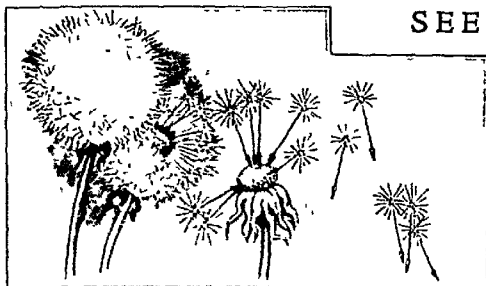
SEDATIVE, *sed'a tiv*, a drug which has a quieting influence upon a part or the whole of the nervous system or any of the organs of the body. General sedatives include chloroform, ether and the hypnotics; local sedatives are cold, heat, cocaine, opium, aconite, etc. Sedatives vary in their effects. In many instances drugs that act as sedatives upon one organ are irritants upon another; and often when small doses are sedatives, large doses excite or irritate. See NARCOTIC; ANESTHETIC, and various articles on the drugs.

SEDGES, *sej'es*, a term promiscuously applied to many marshy plants which look like

grasses but differ from them in having triangular stems, and in their flowers, which resemble minute lilies in form and structure. Most of the hay cut in swampy places is made up of sedges, which are not as succulent nor as nutritious as the grasses. There are numerous species of the sedge, distributed throughout all parts of the world, so nearly alike that only botanists can distinguish them. The Egyptian papyrus belongs to this family.

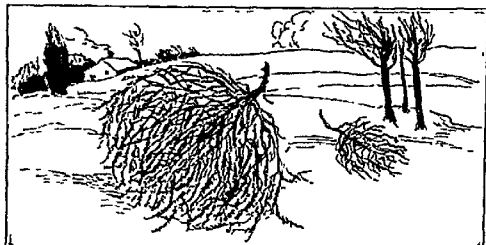
SEED DISPERSAL. If no seeds ever grew except those that are gathered and carefully planted, only a very small part of the earth would have green things growing upon it. But fortunately for the plants, most of them do not have to depend on people to carry their seeds about. They are provided with all kinds of ingenious apparatus to do the work for them. If the tiny dandelion seed had to depend upon itself it would never get far; it would probably stay on the head of the stalk until that withered, and then it would fall to the ground. But the dandelion seed has white, feathery wings. A puff of wind takes up a number of the seeds with their feather tops and carries them away, sometimes perhaps, bearing them for miles before it drops them. The thistle and the milkweed seed have the same kind of little white hairs, which help them to find their way about. The elm and the ash and the maple have winged fruits, but these wings are different. They are made of a sort of membrane which looks more or less like the inside wing of a grasshopper. However, they do just the same duty as the fluffy wings of the milkweed—they help the wind to carry the seed and scatter it everywhere. Those who live in the country where there are open stretches may see dried-up plants, rolled up almost into a ball, blowing about the prairies and piling themselves up by fences. These plants, which have broken off near the ground, are known as tumbleweeds, and they are doing just what the pansy does when its seed-pods shoot open—scattering their seed. The seeds are held rather firmly by the plant, so that they do not all fall out at once, but are strewn over long distances. This is the way the Russian thistle and the pigweed and the ticklegrass spread themselves over so much ground, for those three troublesome plants are all tumbleweeds. The seeds of the cocklebur are in the burs, and when those troublesome things stick to people or to animals the seeds are scattered. All the other kinds of

SEED TRAVELERS



Most plants grow seeds. But the seeds must be scattered. Some seeds, like the dandelion's, the milkweed's or the thistle's, may travel for miles with dainty parachute before the breezes let them down to rest on the earth.

The autumn winds engage in many a foot-ball game, kicking the tumble-weeds over and over across the prairies, making "touch-downs" against fences or clumps of brush. But in the "scrimmages" of the games the weeds have thrown far and wide their precious seeds.

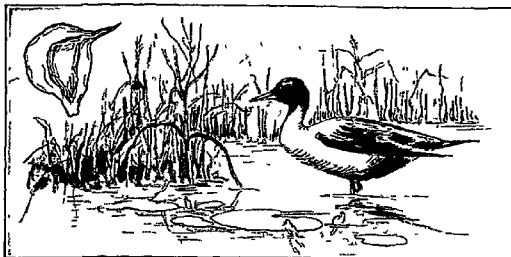


The seed of the maple and the ash is fitted with filmy wing like the dragon-fly. Upon this wing it flies away before the wind till dropped in some sheltered nook, perhaps far from the parent tree

The sedges beside river or lake ripen their seeds in little air-filled balloons. These drop to the surface of the water and are carried by current or winds till caught in some tiny cove. Here the balloons burst open and drop the seeds into the mud

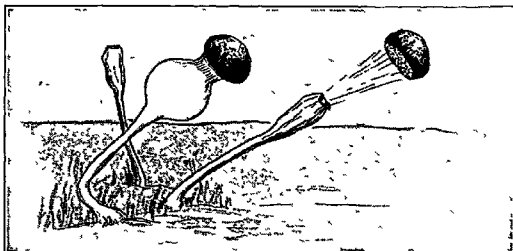


Ever plant fern seed? Hardly. Ferns don't have seed. This drawing shows what they do have. Read all about it. Look up Ferns and Spores. Find some ferns growing and examine closely the under side of the leaves.



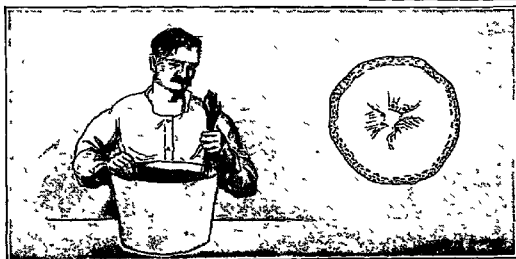
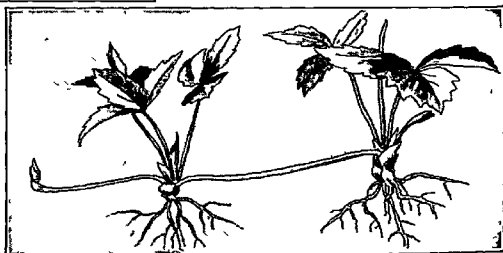
Shore and marsh birds carry many seeds in the mud that clings to their feet. Other birds carry off berries and small fruits and drop the seeds in many places a long distance away.

Then the plants which stick out sharp little fingers or barbed hooks to catch the wool of sheep or little boys' clothing. How many free rides they get, and how well they distribute their seeds.



The "sling-fruits" plants, such as the morning-glory, pansy, "touch-me-not", burst their seed-cases at the right time, and sling or shoot the seeds to a little distance. Some lower forms like the pilobolus blow their seed-cases as shown here.

Some plants don't want to depend entirely on seed. The strawberry travels with a hop, skip and a jump, sending out one runner after another and dropping rootlets into the earth here and there.

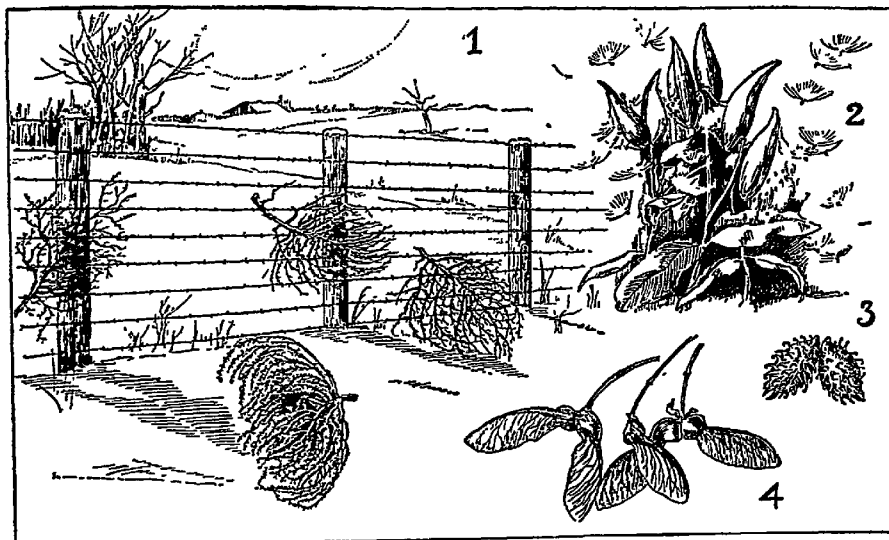


The banana, poor fellow, has no seeds at all. Only little dots of "used-to-be" seeds. He must depend on friendly hands to transplant his sprouts.

bur plants, the sand bur, the sticktight, the burdock, have their seeds carried about for them in the same manner.

In these ways and in other ways seeds are scattered, and if all plants that spring from

Seed Construction. Each seed consists of an embryo and a supply of food, protected by a more or less hardened coat. The embryo is a minute plant, one part of which has the power to grow upward to the light and air,



SEED-SCATTERING DEVICES

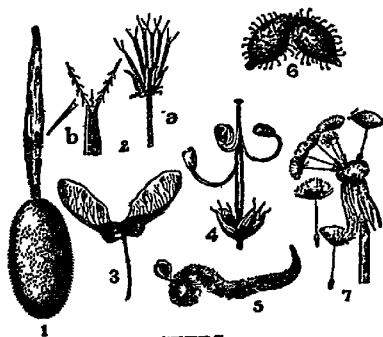
1 Tumbleweed 2 Milkweed 3 Cocklebur 4 Winged seeds of maple

seeds matured the earth would be choked with vegetation. For example, a morning-glory has just about an average number of seeds—three thousand to a single healthy plant. If all of these seeds were planted, and grew, there would be nine million plants the next year. The following year there would be twenty-seven billion plants, and the year after that eighty-one trillion. At this rate it would not take the descendants of a single morning-glory very long to cover much of the earth. Indeed, it is a well-known fact that if there were no check to the growing of plants, the whole surface of the land would soon be covered with vegetation denser than that in the thickest tropical jungle—so dense that men and animals could not get through. In the struggle for existence, however, the weaker plants are crowded out, and a proper balance is maintained. See BOTANY.

SEEDER. See SOWING MACHINE

SEEDS, the name in botany given to the ripened ovules of plants. Sometimes they are called "plant babies," as each contains the nucleus of a tiny plant.

where it develops leaves and flowers; the other part has the power to develop roots, which grow downward into the darkness of the soil in search of food and moisture. In



SEEDS

1, squirting cucumber, 2, bidens, a, the full head b, fruit enlarged, 3, maple, 4, geranium, 5, clematis, 6, cocklebur, 7, dandelion

the seed the food supplies are in some cases placed around the embryo, while in others they are stored in the embryo itself

coverings of the seeds are so marked that a person knowing them can easily recognize the species from which they came.

Some seeds are hard and dry, or stony; others develop appendages, such as wings, or silky hair, evidently intended to aid in their distribution. In a few species there is an extra covering, called an *aril*, which is either fleshy or sacklike, as may be seen in the mace of a nutmeg.

Seed Testing. To secure the best prospects for a good crop, successful farmers test their seeds before planting. Professor Nobbe established the first laboratory for testing seeds at Tharand, Saxony, in 1869. Since that time laboratories have been established in most European countries, where in numerous instances the quality of the seed is under governmental control. Seed testing laboratories are found in the United States in connection with the national Department of Agriculture and many individual state experiment stations.

A simple device for seed testing consists of two plates of the same size. A piece of blotting paper marked off into squares two inches in diameter is placed in one plate. Enough water is poured into the plate to moisten the paper, and ten seeds to be tested are dropped in each square. Over these another piece of blotting paper, on a damp cloth, is placed, and this is covered by turning the second plate over the first. The blotter must be kept moist, and the plates set where the temperature will be about the same as that of the soil at the time of planting. In eight or ten days the seed should have germinated (sprouted). The number of seeds that have germinated in each square should be counted, and thus the percentage of good seed in the lot from which the seeds were taken is estimated. See SEED DISPERSAL.

SEEGER, ALAN (1888-1916), an American poet who made one of the most notable contributions to the poetry of the World War in his splendid lyric, *I Have a Rendezvous with Death*. He was born in New York City, but spent part of his boyhood in the City of Mexico. In 1910 he was graduated at Harvard University, and two years later went to Paris, where he continued to write poetry, which had been begun in his college days. In August, 1914, shortly after the outbreak of the World War, he enlisted in the Foreign Legion of France. The young poet spent many weary months in drilling

and becoming inured to the monotony of trench life, but in the spring of 1915 he took part in the Battle of Champagne. After this engagement his regiment passed to the rear and was not sent to the front until May, 1916. On July 4 the Legion was ordered to clear the enemy out of the village of Belloy-en-Santerre, and in the first advance Seeger fell wounded. The next morning his dead body was found on the battlefield.

Alan Seeger's poems were published in America in December, 1916. They include his early verse, entitled *Juvenilia*, a number of sonnets and translations of Italian classics, and his war poems. His most famous lyric appears below. Another notable poem, *Ode in Memory of the American Volunteers Fallen for France*, was written in two days in the midst of trench hardships.

The poem that immortalized Seeger is given in full below:

I have a rendezvous with Death
At some disputed barricade,
When Spring comes back with rustling shade
And apple blossoms fill the air—
I have a rendezvous with Death
When Spring brings back blue days and fair.

It may be he shall take my hand
And lead me into his dark land
And close my eyes and quench my breath—
It may be I shall pass him still
I have a rendezvous with Death
On some scarred slope of battered hill,
When Spring comes round again this year
And the first meadow-flowers appear.

God knows 'twere better to be deep
Pillowed in silk and scented down,
Where Love throbs out in blissful sleep,
Pulse nigh to pulse, and breath to breath,
Where hushed awakenings are dear * * *
But I've a rendezvous with Death
At midnight in some flaming town,
When Spring trips north again this year,
And I to my pledged word am true,
I shall not fail that rendezvous.

SEIDLITZ, *sed'lits*, POWDERS, a medicine, named after the Seidlitz spa in Bohemia. These powders are usually put up in blue and white papers, the blue containing tartrate of soda and potash (Rochelle salt), with bicarbonate of soda; and the white, tartaric acid. The contents of the blue paper are dissolved in half a tumbler of water, and the acid powder is then added. The draught is taken during the effervescence, which begins at once. The medicine is mildly laxative.

SEIGNIORAGE, *seen'yer ayj*, a royalty or prerogative of the sovereign whereby an allowance of gold or silver, brought to a mint

in the mass to be exchanged for coin, is claimed. In modern times the meaning has not changed. Any person owning gold in any form may take it to a government mint and exchange it for gold coin, ounce for ounce, except that enough is deducted to pay for coining the bullion. This deduction is seigniorage.

SEINE, *sayn*, the most picturesque river of France and its most important trade route. The city of Paris lies on its banks. It rises in the department of Côte-d'Or, flows north-northwest and enters the English channel between Havre and Honfleur. Because of its circuitous course, it is 475 miles long, and it is navigable for 350 miles. Its mouth is an estuary six miles wide, where is situated the city of Havre. To enhance its commercial value numerous locks and canals have been constructed to connect it with the Scheldt, the Meuse, the Rhine, the Rhone and the Loire. The first settlement which became Paris was on the Isle de la Cité, in the River Seine.

SEISMOGRAPH, *size'mo graf*, an instrument for measuring the force and direction of earthquakes and other earth movements. The essential part of a seismograph is a pendulum so delicately suspended that it is unaffected by earth movements. The record is made by the movement of the surface beneath it. Some types of the apparatus are so constructed that the record is produced photographically upon a moving piece of sensitized paper or film; others are so made that a stylus traces the record on smoked paper attached to a movable cylinder. So sensitive is this delicate little instrument that it can record at Rio Janiero earth disturbances in Japan, on the opposite side of the globe.

SELENE, *se lé'ne*, in Greek mythology, the goddess of the moon, daughter of Hyperion and Thea and sister of Helios (the sun) and Eos (the dawn). She was also called Phoebe, and in later times was identified with Artemis. In art she was often represented as a beautiful woman with large wings and a flowing robe, and wearing a coronet.

SELENIUM, a rare chemical element, discovered by Berzelius in 1817 in the refuse of a sulphuric acid manufactory near Fahlun, in Sweden. It occurs in several minerals, chiefly in combination with sulphur, copper, lead, mercury and silver, and is closely related in its general chemical properties to sulphur and tellurium. Selenium takes fire

when heated to a tolerably high temperature in air or in oxygen, burning with a blue flame and a disagreeable odor. With hydrogen selenium forms the very disagreeably smelling gas, *selemureted hydrogen*, the analogue of *sulphuretted hydrogen*. In metallic form it is a conductor of electricity, the power of which is increased by sunlight.

SELF-DENYING ORDINANCE, *awr'da-nans*, an enactment passed by the British Parliament in 1645, decreeing the resignation of all members of that body who had held any civil or military office during the Civil War between Charles I and Parliament. Its object was to remove inefficient commanders for the remodeled army and to give control of the army to radical Independents rather than to Presbyterians. Cromwell, who was a member of Parliament and an officer in the army, was excepted and reappointed to the command of the cavalry as lieutenant-general.

SELJUKS, *sel'jooks'*, a Turkish dynasty very powerful in Asia in the eleventh and twelfth centuries, so named after Seljuk, a chieftain of the Ghuz Turks. Persia was conquered by the Ghuz Turks in 1030, and thus formed the nucleus of the empire, which later extended over Armenia, Turkestan, Syria and Asia Minor. In the First and Second Crusades, the Christians came into conflict with the Seljuks because of their cruelty toward pilgrims to the Holy Land (see *CRUSADES*). The Seljuk dynasties held sway until the end of the thirteenth century, the Ottoman Empire in Asia being founded upon the ruins of the Seljuk Empire. Omar Khayyam (which see) flourished during the period of Seljuk supremacy.

SELKIRK, ALEXANDER (1676-1723), a Scotch adventurer, whose experiences on an uninhabited island inspired the story of *Robinson Crusoe*. He took part in buccaneering expeditions in the Southern Pacific, and in consequence of a quarrel with his captain he was put ashore, at his own request, on the island of Juan Fernandez, off the coast of Chile. There he lived alone for four years and four months, until he was rescued by the captain of a privateer. He returned home in 1712, and his adventures became known to the public. He afterward rose to the rank of lieutenant in the navy. Defoe's *Robinson Crusoe* appeared in 1719, but Crusoe's experiences have but little in common with those of Selkirk. See ROBINSON CRUSOE, JUAN FERNANDEZ, for illustration.

SELKIRK MOUNTAINS, a range about 200 miles long and eighty miles wide, situated in the southeastern part of British Columbia and noted for its great glaciers and the rugged magnificence of its scenery. The range is west of the Rockies and extends from the United States boundary to the great loop of the Columbia River. Its highest peaks are Mount Sir Sandford, 11,634 feet, and Mount Sir Donald, 10,645 feet. Gold, silver, copper, zinc, mercury, coal and marble have been found here. The range has been named in honor of Thomas Douglas, Earl of Selkirk (which see).

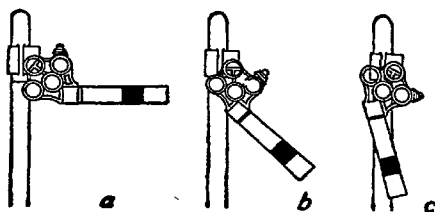
SELMA, ALA., the county seat of Dallas County, fifty miles west of Montgomery, on the Alabama river at the head of navigation, having steamship connection with Mobile. It is on the Louisville & Nashville, the Southern, and the Western of Alabama railroads. The city is in a cotton-growing region and contains cotton, cottonseed-oil, flour and planing mills, railroad shops, machine shops and other factories. The city has three business schools, a landing field for airplanes, motor-bus routes, a school of music, a hospital, a country club, a Carnegie Library, a Y. M. C. A. and a county courthouse. There is a fine bridge across the river. Population, 1930, 18,012.

SELVAS, sel'vas, a stretch of dense woodland plains of the Amazon Valley, in South America, extending from Northern Brazil to the southern part of Venezuela. Brazil-nut, cacao, wax-palm, and other varieties of trees grow in abundance amid dense tangles of cacti, orchids and creeping tropic vines, while from this great forest Brazil exports in addition to many kinds of valuable wood, immense quantities of rubber and bamboo.

SEMAPHORE, sem'a for, a device used for signaling in navies, in the army and on railroads. Before the invention of the telegraph, many kinds of semaphores were in use, but electric communication now has rendered them unnecessary in many instances.

The simplest form of semaphore is that employed on railways. It consists of an upright standard, from three to eighteen or twenty feet in height, as conditions necessitate, to the top of which one or more boards, called *arms*, are attached. These arms are fastened to the standard so they can be raised or lowered from the office of the telegraph operator. The long arm is usually painted red or white, and the short arm contains an

iron frame, in which are placed red and green glasses, one above the other. When the arm of the semaphore is dropped, it indicates a clear track; if raised to an angle of 45°, it



SEMAPHORE

a, stop, b, caution, go slowly, c, way clear, go ahead.

indicates caution; if raised to a horizontal position, it indicates that the train should stop. At night the colored glasses in the short arm give the necessary signals. When the arm is dropped, a white light is shown; at an angle of 45°, a green light; and when in horizontal position, a red light. See RAILROAD.

SEMBRICH, sem'brik, MARCELLA (1858-1935), an operatic soprano whose real name is MARCELLINE KOCHANSKA, was born at Lemberg, in Galicia. At first she studied violin and piano, but upon the discovery of her remarkable voice, she began to study at Milan. After a successful operatic debut at Athens in 1877, she became the leading soprano in the Dresden court theater, where she remained until 1880. During the next five years she received great ovations in her frequent concert tours to England and America. After 1889 she resided in Dresden, continuing her public work, largely in recitals in Europe and America, although appearing as the leading soprano for several seasons at the Metropolitan Opera House, New York. Critics accorded Sembrich unanimous praise for the purity and flexibility of her voice.

SEMELE, sem'e le, in Greek mythology, a daughter of Cadmus, beloved by Jupiter. Jealous of her husband, Juno persuaded Semele to entreat her lover to attend her with the majesty in which he appeared on Olympus. As he had sworn to gratify her every wish, Jupiter, though horrified at this request, came to her accompanied by lightnings and thunderbolts, which were too powerful for a mortal, and Semele was instantly consumed by fire. Bacchus, the god of wine, was her son by Jupiter.

SEMINOLE, *sem'nohl*, a Muskogean tribe of Indians who originally lived in Florida. They consisted chiefly of immigrants from the Lower Creek towns on the Chattahoochee River, and took their present name about 1775. The Seminoles first came into conflict with the United States in 1817, when General Andrew Jackson invaded their territory. After the cession of Florida to the United States in 1819, a treaty was made with them providing for their removal west of the Mississippi River, but a large number, under the leadership of the celebrated Osceola (which see), refused to be bound by the treaty. Their heroic efforts to hold their territory and to prevent themselves from being removed west of the Mississippi were so successful that it was only after a war of seven years (1835-1842), which cost the United States \$10,000,000 and 2,000 lives, that the Seminoles were transported to what is now Oklahoma and finally settled there, where their descendants are American citizens. A few still remain in Florida, where they are permitted practically self-government in the Everglades section.

SEMRAMIS, *se mir'a mis*, a queen of Assyria, whose history is a mingling of fact and fable. Tradition credits her as the founder of Babylon and the conqueror of Persia and Egypt. According to the story, she was a daughter of the fish goddess Derceto by a Syrian youth. When deserted by her mother, she was fed by doves until discovered by the chief of the royal shepherds, who adopted her. Her beauty attracted King Nimus of Assyria, who made her his wife. Upon the death of her husband she reigned gloriously for forty-two years, when she was deposed by her son, when she disappeared. The hanging gardens of Babylon are attributed to her. Catharine II of Russia was called the Semiramis of the North.

SEMITES, *sem'ites*, who together with the Hamites and the Aryans constitute the three great divisions of the white race, are a west-Asiatic group of people, including the Hebrews, Assyrians, Chaldeans, Carthaginians, Arabians, Babylonians, Phoenicians and various other peoples, closely akin in physical and mental characteristics, religion and language. The name is derived from that of Shem, the son of Noah, but is not rightly applied to all of the peoples who are given in *Genesis X* as the descendants of Shem. Judaism, Christianity and Mohammedanism

had their origin with the Semitic races; our alphabet comes from the Phoenicians.

SEMITIC LANGUAGES form an important linguistic family, usually divided into a northern and a southern section. The northern group includes the ancient dialects of Assyria and Babylonia (recovered by means of the cuneiform inscriptions), the Hebrew, the Phoenician and the Aramaic. Of these, the Hebrew alone is extant as a spoken language. The most important of the south Semitic tongues, and the only one now in extensive use is the Arabic. To this southern branch belongs also the Ethiopic, or ancient ecclesiastical language of Abyssinia. The greatest literary attainments of the Semites are the Bible and the Mohammedan *Koran*.

Related Articles. Consult the following titles for additional information:

Alphabet	Hebrew Language
Christianity	and Literature
Cuneiform	Jews
Inscriptions	Mohammedanism

SEMMES, *sems*, RAPHAEL (1809-1877), an American naval officer who commanded the *Alabama*, the famous Confederate vessel of the Civil War, was born in Charles County, Md. He entered the navy in 1832, having previously studied law, took part in the Mexican War, and at the outbreak of the Civil War joined the Confederate service. As commander of the *Sumter*, and later of the *Alabama*, he captured many prizes (see *ALABAMA*, *THE*). Semmes was later placed in charge of the James River squadron. He was imprisoned after the war, but gained his liberty at the amnesty. He then devoted himself to his law practice and to the writing of several books, notably *Service Afloat and Ashore*, *Cruise of the Alabama and Sumter* and *Campaign of General Scott in the Valley of Mexico*.

SEN'ATE, originally the supreme legislative body of ancient Rome, first instituted, according to tradition, by Romulus. Under the Republic the consuls, the consular tribunes and the censors had the power of choosing the senators; but they were restricted to those who had previously held magistracies, and as the magistrates were chosen by popular election, the senate was ultimately a representative body. In the administration of affairs the senate was supreme, and during national crises it could invest the consuls with absolute and dictatorial authority. Its numbers varied from 100 to 1,000, being often increased or diminished to suit the wishes of various emperors and dictators.

In modern times the term is applied to the upper, or less numerous, branch of the legislature in various countries, as in the United States, Canada, France, in most of the separate states of the Union and in some of the Swiss cantons. It is also used to designate the governing body of certain universities. See below.

SENATE OF THE UNITED STATES, the upper and smaller branch of the national Congress. The Constitution of the United States, in Article I and in Amendment XVII, states the fundamental law under which the body is organized.

There are two Senators from each of the forty-eight states of the Union. It was intended that they should represent the states in Congress; therefore the Constitution placed upon the state legislatures the duty of electing them. The Seventeenth Amendment, adopted in 1912, took this privilege from the legislatures and vested their election directly with the voters. They yet represent the sovereign states, but are probably more responsive to the wishes of the people by the present manner of election. The term of a Senator is six years; one-third of the Senators retire every two years, on the 3rd of January (after 1933), so the Senate, unlike the House of Representatives, is a continuous body.

The powers and duties of Senators are co-ordinate with those of Representatives, in most respects. The Senate cannot originate revenue bills, the initiative resting with the House. It has the sole power to sit as a court to try impeachment cases after the House has voted impeachment of an officer of the government. The Senate is one arm of the treaty-making power of the government, for it must approve all treaties made by the executive department before they can become effective. In other respects the powers of the two houses are equal.

The presiding officer of the Senate is the Vice-President of the United States. Not being a member of the body, he can vote only in case of a tie. The Senators choose one of their own members, known as president *pro tempore*, to preside when the Vice-President is absent. The salary of the Vice-President was raised in 1925 from \$12,000 to \$15,000. The salary of Senators was raised at the same time to \$10,000.

Related Articles. Consult the following titles for additional information:
 Congress
 Constitution of the United States
 Representatives,
 House of
 Vice-President

SENECA, *sen'e ka*, a tribe of American Indians, who when first known inhabited the western part of New York state between Seneca Lake and the Genesee River. They were the largest and most powerful tribe in the Iroquois federation known as the Five Nations (which see). They conquered the Erie and the Neutral Nation and absorbed the remnants of those tribes, about 1650, then extended their settlements into the country west of Lake Erie and southward along the Allegheny River. In the Revolutionary War they supported the British. About 2,500 now live on their reservation in New York, and a few are found in Oklahoma and Ontario. They have adopted the dress and customs of civilization.

SENECA, LUCIUS ANNAEUS (about 4 B. C. -A. D. 65), a Roman philosopher who taught the doctrine of the Stoics, and one of the most brilliant men of letters of his time. He was born at Corduba (Cordova). When quite young he studied in Rome, where he made rapid advance under the tuition of his father. On his recall from Corsica, where he had been banished for eight years, he was made praetor, and was appointed one of the tutors of Emperor Nero. For a few years Seneca exerted a strong influence over his wayward pupil, but eventually only jealousy and hatred were engendered. After Nero had drawn Seneca into a conspiracy, he was forced by Nero to commit suicide. Seneca's extant works comprise moral treatises on *Anger*; on *Providence*; on *Tranquillity of Mind*; on *the Steadfastness of the Wise Man*; on *Clemency*, addressed to Nero; seven books on *Benefits*; seven on investigations of nature, and twenty books of moral letters. The tragedies which bear Seneca's name are inferior to his prose writings. See STOICISM.

SENECA LAKE, the largest of the group known as the Finger Lakes, in the western part of New York, and a favored summer resort because of its scenic attractions, notably Watkins Glen and Cayuga Lake Park. The lake is thirty-seven miles long, from two to four miles wide, and 630 feet deep. Seneca Lake flows into Lake Ontario, through Seneca and Oswego rivers, and is joined by a canal to the Erie canal. See NEW YORK STATE BARGE CANAL.

SENEGAL, *sen'e gawl'*, a river of Africa, on the southwestern border of the Sahara Desert. It rises near the sources of the Niger, from which its sources are separated

by the highlands of the Mandingo country. Its course is northwest and west through the Senegambia and Niger territories, and it enters a lagoon on the Atlantic Ocean near the town of Saint-Louis. The river has two picturesque cataracts, Guine and Felu. The basin drained by the Senegal is hot and unhealthful. About 700 of its 1,000 miles are navigable, but much of its course is dangerous to shipping.

SENEGAL, a French colony in West Africa, extending from the Gambia River on the south to the Senegal on the north, and from the Atlantic Ocean eastward somewhat indefinitely. It has an area of about 74,000 square miles and a population of about 1,250,000, of which 4,600 are whites. The region is mostly low, and in some sections the soil is unfertile, but in some portions of the Senegal Valley there are luxuriant forests. The climate is hot and unhealthful. The products consist of coconuts, rubber, raisins, millet and maize. The capital is Saint-Louis which is connected by railway with Dakar and Rufisque. There are no manufactures, and the commerce is comparatively unimportant. See **FRENCH WEST AFRICA**.

SENEGAMBIA, a territory in West Africa, now known as Senegal (which see).

SENNACHERIB, *sch nal'c rib*, an Assyrian king, son of Sargon, who reigned from 705 to 681 B. C. He suppressed the revolt of the Babylonians, reduced part of Media, exacted tribute from Tyre and other Phœnician cities, advanced upon Philistia and Egypt and finally proceeded against Hezekiah, king of Judah, who had revolted. Yielding to panic, Hezekiah paid the tribute exacted, but when Sennacherib again invaded Judah, a miraculous visitation caused the death of thousands of his troops. Sennacherib built the embankment of the Tigris and made canals and water courses, but his architectural triumph was the palace of Koyunjik, which covered eight acres.

SENSATION, a mental impression received through the excitation of a sensory nerve. The conditions necessary to a sensation are (1) a stimulus acting upon the ends of a sensory nerve; (2) the transmission of this stimulus to the nerve center with which the excited nerve is connected, (3) reaction of the brain upon the stimulus.

Intensity. The intensity of a sensation depends upon two classes of conditions—those which are external and those which are inter-

nal. The external conditions are (1) the intensity of the stimulus, for instance, the sensation from the light of a candle is not as intense as that from an electric light, (2) the mass or amount of the stimulus, a boy derives more pleasure from a spoonful of sugar than from a few grains; (3) newness of surroundings; because everything is new to him the child has stronger sensations from a certain stimulus than does the adult; (4) prolongation of the stimulus, the intensity is weakened by the prolongation of the stimulus beyond a given time. An odor which is at first keen is scarcely perceived after a few moments. Looking continually at a bright object fatigues the eye, and the color appears more dim, and listening continually to a monotonous sound lessens its intensity.

The internal conditions are (1) attention; sensation becomes more vivid if we give it our attention, (2) condition of mind and body, sensations are weakened by weariness and by some diseases, while they are sometimes intensified by such diseases as irritate the nerves; (3) contrast, sudden changes from one extreme to another increase the intensity, as in passing from a dark room to one brilliantly lighted, or in the hearing of a loud sound when one is in quietude.

Development. At birth the organs of special sense are dormant, and they develop slowly. The best authorities consider touch as the fundamental sense, and it is the one earliest developed. Taste and sight follow closely, and the development of touch aids in their perfection and makes them more acute. While taste and smell are inseparable in the act of tasting, the sense of smell is of later development than the sense of taste. Hearing is developed later than the other senses, but next to sight it is the sense which gives us the widest range of knowledge.

The senses are given to us by nature. We do not learn to taste or smell or see. Although we may improve our recognition and discrimination of sights and smells, we cannot change the sensitivity of our sense organs, and the sensations which they produce. Some people are born with certain highly developed sensitivity. Tea tasters, for instance, have an unusually good sense of taste. Others are born with defective sensitivity. A color-blind person, for instance, cannot see red. The actual sensation is innate and can never be acquired. See **PERCEPTION**.

SENSES. The special senses comprise those organs, sensory nerves and brain centers which respond only to special stimuli. In the order of their complexity they are (1) touch, temperature, and pain; (2) the muscular sense; (3) taste; (4) smell; (5) hearing, and (6) sight. The organs of special sense bring to their respective brain centers impulses which these centers alone can translate, and this translation gives us our knowledge of sights, sounds, etc. It is supposed by some physiologists that the nerve impulses are all alike and that the different interpretations are due solely to the locations of the brain centers; but there is no definite knowledge as to the method by which the impulses conveyed to the brain from the different organs are translated into mental impressions. That these impressions are wholly due to the brain centers is certain. A blow on the back of the head, or the stimulation of the optic nerve by electricity will cause a sensation of light in the darkest room. Each sense organ contains the end of a sensory nerve. Each sensory nerve gives just one kind of a response. If the auditory nerve is stimulated by pressure or by an electrical stimulus, a sound will be heard. A hot needle will feel cold if it is placed on a cold sense spot.

The sense organs for touch, heat, cold, and pain, may be found in various places in the skin. Their frequency varies. The fingertip has many "touch spots" close together. The back of the heel has few touch spots. If you take a very fine pointed instrument and touch different places on your arm with it, you will see that it may feel hot, cold, painful, or just give a sensation of pressure. The muscle or kinaesthetic sense organs are located in the muscles, tendons, or joints. These give rise to the sensations of movement and bodily position.

The sense of taste is located on the surface of the tongue. Different parts of the tongue are sensitive to the four different tastes, sweet, sour, salt, and bitter.

Hearing and sight are very highly localized; hearing in the ear, and sight in the retina of the eye. They are very complex and psychologists are not agreed upon the exact way in which they function.

Related Articles. Consult the following titles for additional information:

Ear	Smell
Eye	Taste
Nervous System	Touch

SENSITIVE PLANT, *sen'si tiv*, a plant native to south America, so called because at the approach of night or when shaken or roughly handled its leaflets fold over each other in pairs and each of the leafstalks bends toward the stem as if shrinking from its intruder. At sunrise, or when undisturbed, the leaves gradually unfold and recover their normal state. Many species of different families show similar sensitiveness in lesser degree.

SEOUL, *sa ool'*, now called Kejō-fu, the capital of the Japanese province of Chosen, or Korea, situated on the Seoul River, about three miles north of the Han River and about nineteen miles northeast of Chemulpo, its port on the Yellow Sea. The two cities are connected by rail, and there is also rail communication between Seoul and the cities of Fusan and Wiju. Seoul was the capital of old Korea over 600 years. It has the narrow streets and mean houses so common in Oriental countries, but is slowly being modernized, and now possesses electric lighting, telegraph and telephone service and electric street transportation. There are few buildings of interest besides the Roman Catholic cathedral, the ancient royal palace and a temple to Confucius. Population, 1933, 374,909. See CHOSŌN.

SEPARATOR, CREAM. See CREAM SEPARATOR.

SEPIA, the name of a cuttlefish, also of a pigment used by painters to produce a beautiful brown color prepared from the secretion of an organ in the cuttlefish, called the *ink bag*. The original black color is changed to brown by dissolving in caustic potash. This solution, after boiling and filtering, forms the sepia of commerce. The black coloring matter obtained from the ink bags is marketed, after undergoing several processes, as India ink. See CUTTLEFISH; INDIA INK.

SEPOY, a native British Indian soldier. The Sepoys who are of practically every race and tribe in India, have been a part of the British forces since the middle of the eighteenth century, and except at the time of the rebellion (1857) have always been loyal to England. There are now about 140,000 Sepoys in the British service, officered by both natives and Europeans. They are courageous, temperate and hard fighters and are an important part of the British army in India. See SEPOY REBELLION.

SEPOY REBELLION, *re bel'yun*, a mutiny of native troops in India which began in May, 1857. It was the result of resentment over the introduction of Western ideas, particularly the English disregard for native customs and religious beliefs. The Hindus will not taste anything derived from a pig or a cow, and consequently when the Sepoys, as the native troops are called, were ordered to use greased cartridges, they objected to biting the cartridge casings and rose in revolt. The rebellion started at Meerut, near Delhi, and spread to Delhi, Cawnpore and Lucknow, and many Europeans, including women and children were massacred. The revolt was crushed in June, 1858. The effect of the rebellion was far-reaching, one result being the transfer of the government of India from the East India Company to the crown.

SEPTEMBER, the ninth month, the month combining

"Summer's best of weather
And autumn's best of cheer."

The name is derived from the Latin word for *seven*, for in the old Roman calendar September was the seventh month. When Julius Caesar made his calendar revisions September became the ninth month, but retained its name. Then, as now, it had thirty days. About the twenty-second of the month the sun crosses the equator on its journey toward the Tropic of Cancer, and days and nights are equal all over the world. In September we look back to fading summer and forward to the falling of the leaves and other tokens of autumn. In northern climes there are occasional hot, dry September days much like those of August, but they pass quickly by, and are soon replaced by October's "golden weather." Among the wild flowers blooming in September are the fringed gentian and the wild aster. The goldenrod is September's flower emblem, and the sapphire its special gem.

Special Days for Observance. The first Monday of September is celebrated as Labor Day throughout the United States and Canada. This is the only general September holiday, but American negroes celebrate September 22, as Emancipation Day.

Anniversaries for Celebration. The following birthdays of notable people fall in September:

Peter Cartwright, September 1, 1785
James Gordon Bennett, September 1, 1795
Henry George, September 2, 1839
Eugene Field, September 2, 1850

Sarah Orne Jewett, September 3, 1849
Pindar, September 4, 522 B. C.
Phoebe Cary, September 4, 1824.
Cardinal Richelieu, September 5, 1585
Lafayette, September 6, 1757
Sir Georges E. Cartier, September 6, 1814.
John Addams, September 6, 1861
Queen Elizabeth, September 7, 1533
Richard I., September 8, 1157
Charles Dudley Warner, September 12, 1829.
John J. Pershing, September 13, 1860
Charles W. Gordon, September 14, 1860
Charles Dana Gibson, September 14, 1867
James Fenimore Cooper, September 15, 1789
Francis Parkman, September 16, 1823
Samuel Johnson, September 18, 1709
Alexander the Great, September 20, 356 B. C.
Louis Joliet, September 21, 1645
Clark Howell, September 21, 1863
Caesar Augustus, September 23, 63 B. C.
John Marshall, September 24, 1755
Felicia D. Hemans, September 25, 1793.
Samuel Adams, September 26, 1722
Robert Clive, September 29, 1725
Admiral Nelson, September 29, 1758
Pompey, September 30, 106 B. C.

The following notable events occurred in September:

Rule of India relinquished by the East India Company to the Crown, September 1, 1858
Battle of Actium, September 2, 31 B. C.
Organization of United States Treasury Department, September 2, 1789
New style calendar adopted in Great Britain and its colonies, September 3, 1752
Treaty of Paris signed, September 3, 1763
Third Republic declared in France, September 3, 1870
First Continental Congress met in Carpenter's Hall, Philadelphia, September 5, 1774
Mayflower sailed from Plymouth, September 6, 1620
President McKinley shot, September 6, 1901
Peary announced his discovery of the North Pole, September 6, 1909
First Battle of the Marne begun, September 6, 1914
Galveston tornado, September 8, 1900
California admitted to the Union, September 9, 1850
Battle of Lake Erie, September 10, 1813
Battle of the Plains of Abraham, September 13, 1759
American victory at Saint Michel, September 13-14, 1918
Constitution of the United States signed by the Convention, September 17, 1787
Quebec surrendered to the English, September 18, 1759
President Garfield died, September 19, 1881.
Death of Nathan Hale, September 22, 1776
Balboa discovered the Pacific, September 25, 1513.
Holy Alliance formed, September 26, 1815.

SEPTIMIUS SEVERUS, AROH OF, a triumphal arch in Rome, located at the end of the Sacred Way, on the Forum. It was erected in A. D. 203 by the Senate and dedi-

ected to the Emperor Septimius Severus and his two sons, Caracalla and Geta, in commemoration of the victory over the Parthians and Arabians. The arch is seventy-five feet high and bears inscriptions and reliefs descriptive of the campaigns of Severus.

SEPTUAGINT, *sep'tu a jint*, the oldest Greek version of the Old Testament, believed to have been begun in the third century B. C., in Alexandria, Egypt, and completed before the Christian Era. Its name refers to an early belief that it was written in seventy-two days by seventy-two scholars brought by Ptolemy Philadelphus from Jerusalem. The oldest existing copies are still used by scholars for criticism and comparison of the text with other versions of the Old Testament.

SEQUOIA, *se kwo'i'a*, large trees belonging to the cypress family, found on the Coast Range and the Sierra Nevada mountains in California and Oregon. There are but two species, one popularly known as the *big tree*, the other as the *redwood*.

The Big Trees. This name is given to a number of trees found only on the western slope of the Sierra Nevadas in California. These trees grow in groups, popularly called groves, and stand amidst smaller trees of different kinds. The Mariposa grove, sixteen miles south of Yosemite Valley, is now a part of Yosemite National Park. Another national park, the Sequoia, contains over 1,000,000 of the big trees; an area of 2,560 acres about General Grant Tree is also a national park (see **PARKS, NATIONAL**).

The average height of the big trees is 275 feet; a number, however, attain 300 to 325 feet. The average diameter is twenty feet, though the largest trees measure twenty-five and thirty feet. The trunk is straight and slightly tapering, bearing on the upper half or third a crown of branches. Branches are seldom found below 125 or 150 feet. The bark of the old trees is cinnamon-red, and is reddish-purple on the young. It has an average thickness of eleven or twelve inches, but on some of the largest trees it is two feet in thickness and is deeply grooved and very rough. As the bark does not burn readily, it serves to protect the trees from forest fires. The branches are short and thick, and divide into tufts of fine spray which bear short, flat leaves, closely crowded together. The fruit is a cone about two inches long and one and one-half inches in diameter, each of which

produces many tiny seeds. The wood is soft and of a slightly reddish hue.

Examples of Size. In 1854 one of the big trees was cut down. The task was accomplished by boring off the trunk with augers, and it took five men twenty-two and one-half days to accomplish the work. A pavilion was built on the stump, which is now used as a dance hall, affording ample room for twenty couples on the floor and for the musicians and a fair number of spectators.

Another fallen tree in this grove was over 400 feet in height and measured 30 feet in diameter at its base. The heart has been burned out, and a man can ride through the hole in the trunk on horseback for a distance of ninety feet and emerge through an opening caused by the breaking off of a limb.

In the Mariposa grove a roadway has been cut through one of the standing trees, the tunnel being wide enough to afford ample room for the largest vehicles, yet this does not seem to have affected the strength or life of the tree.

Age and Tradition. The age of the big trees is not definitely known. They are probably the oldest living objects upon the earth, the largest being estimated to be from 2,500 to 3,000 years old—over six hundred years of age at the birth of Christ. According to Indian belief, the big trees alone were especially created by the Great Spirit; all other trees of the forest grew just like other plants. The genus was named in honor of Sequoyah, a half-caste Cherokee Indian who invented an alphabet for his tribe.

Redwood. Like the giant sequoias, the redwoods attain heights of 250 to 300 feet, with diameters often of fifteen feet. These trees are found on the Pacific side of the Coast Range in California and Southern Oregon, and are the most valuable timber trees west of the Rockies. The redwoods are being felled faster than the big trees, as they are more accessible. Redwoods send up suckers from the stumps and seed themselves, which obviates the danger of forest depletion; this is not characteristic of the big trees.

SERAGLIO, *se ra'l'yo* (properly, **SERAI**), the palace and surrounding buildings formerly serving as the royal palace of the sultan at Constantinople. Because it had not been used by the sultan since 1839, it fell into ruin. Situated on a point of land projecting into the sea, its walls embrace a circuit of about nine miles, including several

mosques, the museum of Constantinople, the harem, and buildings capable of accommodating 20,000 men. Among the Turks the name was often used to designate any residence of the former sultan.

SERAJEVO. See **SARAJEVO**

SERAPIS, *ser'ap'is*, an Egyptian deity, compounded of the names Osiris and Apis, introduced into Egypt in the reign of Ptolemy I. A magnificent statue of Serapis, doubtless originally a statue of Jupiter, was built at Alexandria in a temple called the Serapeum, the last hold of the pagans in that city after the introduction of Christianity. The Egyptians never acknowledged Serapis in their pantheon; he was the principal deity in the Greek and Roman towns of Egypt. Forty-two temples are said to have been erected to him in Egypt under the Ptolemies and Romans. His worship extended also to Asia Minor and was introduced into Rome by Antoninus Pius. The image of Serapis perished with his temple at Alexandria, destroyed in 389 by the order of Theodosius.

SER'APIS, THE See **BON HOMME RICH-**

ARD



SERBIA, *sur'bi a*, formerly a state of the Balkan Peninsula, proclaimed an independent kingdom in 1882. In 1914 this small slavic nation was attacked by Austria-Hungary, and in the great international conflict which followed it suffered more than any of the other belligerents except Belgium. Overrun by Austrians, Germans and Bulgarians, its people subjected to all the horrors of famine, deportation and the other ca-

lamities of invasion, Serbia was a physical and economic ruin by the end of the World War, in 1919. After the revolution in Austria-Hungary, the provinces known as Slovenia, Bosnia, Croatia, Dalmatia declared their independence. Serbia joined the movement, which resulted in the formation of the Kingdom of the Serbs, Croats, and Slovenes, later it became Yugoslavia. A constitution was adopted in June, 1921, with Alexander I, of the Serbian royal line, as King. The new state received recognition from other nations.

Area and Population. At the outbreak of the World War, in 1914, Serbia had an area of 33,891 square miles, about 850 square miles greater than the area of Maine. According to the boundaries then existing, it lay between Austria-Hungary on the north and Greece on the south, with the Danube and the Save rivers separating it from the dual monarchy. Bulgaria and Rumania adjoined the country on the east, and on the west lay Bosnia, Montenegro and Albania.

Its population in 1914 was nearly 5,000,000 but this number was reduced to 3,500,000 by 1919, according to careful estimates. Of the number who remain, about three-fourths were devitalized from hunger, disease and the strain of war. Large numbers of Serbs were found in the regions adjoining old Serbia, and their union with their kinsmen and the Croats and Slovenes brought an element of strength to the oppressed people of the kingdom so ruthlessly invaded in 1914. The Serbs are intense lovers of freedom, and have long resented the use of the forms *Servs* and *Servia* for Serbs and Serbia. The former terms are not only incorrect, but are distasteful because they are derivatives of the Latin *servus*, or *slave*.

Physical Features. The surface is high and mountainous, the country being traversed by spurs of the Carpathian Mountains in the northeast, the Balkan in the southeast and the Dinaric Alps in the west. None of these is high, and the loftiest summit, Lubotrn, has an altitude of 8,600 feet. The whole country is drained into the Danube, either directly through the Morava, which flows through the center, or indirectly by the rivers that form a part of the boundary. Along the western border are the Drina and the Drin. The climate in the elevated regions is rigorous, but in the valleys and lowlands it is mild and equable. There is plenty of rainfall, and the mountains are covered with forests.

Resources and Industry. Serbia is pre-eminently an agricultural country, and is a land of small farms owned and cultivated by peasants. There are few farms over thirty acres in extent. Wheat, barley, oats, corn, rye and sugar beets are profitable crops, and various fruits, notably plums, are grown. Large quantities of these are dried and exported as prunes, made into marmalade or used in making wine. Silkworms are raised in large numbers, and in the hilly regions ex-

tensive pastures make the raising of live stock an important industry. There are extensive forests of beech, oak and fir, about 1,375,000 acres being under state control.

Flour milling is one of the most important manufacturing industries; before the war there were seventeen large mills in the country. Brewing and distilling, sugar refining, the manufacture of celluloid, carpet weaving, tanning, bootmaking, iron working and the making of pottery are other industries carried on in normal times. The weaving of carpets, a very old industry, is centered in the southeast, in Pirot. The carpets are made of pure wool, colored by local dyers with natural dyes and by a secret process.

Serbia has valuable deposits of coal and lignite and mines of lead, zinc, copper and iron. The mining industry has never been developed to full capacity because of lack of capital and transportation facilities. There was considerable exploitation of the coal deposits by the Germans during the period of occupation.

Transportation and Communication. There are about 975 miles of railroad. A railway between Belgrade and Nish connects with the trunk line which joins Berlin and Vienna with Sofia (Bulgaria) and Constantinople, a factor in Germany's plan for a "Mittel Europa." A railway to Saloniki, Greece, gives Serbia an outlet to the Aegean Sea. The Danube, Drina and Save rivers are navigable.

Government, Religion, Education. Under the constitution of 1903 the executive power is vested in the king, who is assisted by a council of eight Ministers. The people are represented in a legislative assembly called the *Skupshchina*, the members of which are chosen at a general election. There is also a council of state, one-half of whose members are appointed by the *Skupshchina* and the others by the king. The capital is Belgrade, in the northern part of the kingdom, and the Greek Church is the State Church. Elementary education is compulsory, and in all the primary schools under the Ministry of Education it is free, but the rate of illiteracy is high. At Belgrade there is a university founded in 1838, which had over 900 students before the war.

History. In ancient times Serbia formed a part of the Roman province of Moesia. After this it was occupied in succession by Huns, Ostrogoths, Lombards and other tribes. In the seventh century the country was entered

by the Serbians, but in the century following it acknowledged the supremacy of the Byzantine emperors. Later Serbia became independent, and in the middle of the fourteenth century it included all of Macedonia, Albania and Thessaly, the northern part of Greece and Bulgaria. After this its power declined and it became tributary to Turkey, remaining in this condition for about 200 years. In 1718 the greater part of the territory was ceded to Austria, but a few years later was again transferred to Turkey. The oppression of the Turkish government led to several wars, and from 1812 to 1878 the country was ruled by a number of monarchs who were vassals of the sultan. In 1877, during the Russo-Turkish war, Serbia rebelled, and by the Treaty of Berlin in the following year its independence was recognized by the European powers. In 1912 and 1913 Serbia was at war with Turkey and later with Bulgaria, and by the Treaty of Bucharest (1913) it received over 15,000 square miles of territory, comprising four departments. Over 1,700,000 people were added to its population.

In June, 1914, the assassination of the heir to the Austro-Hungarian throne, at Sarajevo, Bosnia, was made the pretext of a declaration of war against Serbia by Austria-Hungary. The latter country claimed that Serbia was the hot bed of Slavic agitation against the integrity of the dual monarchy. Out of this complication was evolved the greater conflict, in which Serbia became a martyred nation. Belgrade was occupied by Austro-German troops on October 9, 1915, and by the close of the year the whole country was under the heel of the oppressor. The sufferings of the people through disease, exhaustion, exile, and persecution from Austrians, Germans and Bulgarians awakened outside sympathy akin to that inspired by the sufferings of the Belgians and Armenians. The aged King Peter and his court removed to Greece for the duration of the war. Late in 1918, Belgrade, then a city stripped of all its valuables, was liberated, but the king remained in retirement, leaving the duties of administration to his son, Prince Alexander, who was proclaimed regent. For later history, see JUGOSLAVIA.

Related Articles. Consult the following titles for additional information:

Balkan Wars	Jugo-Slavia
Belgrade	Monastir
Berlin, Congress of	Nish
Carpathian Mountains	Peter I
Danube	World War

SERFS, a term applied to a class of laborers existing under the feudal system, whose condition, though not exactly that of slavery, was little removed from it. Under feudalism, from the vassals of the king downward, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his land. In the case of the lower classes this servitude amounted almost to complete surrender of personal liberty. There were two classes of laborers, the villeins and the serfs proper, the former occupying a middle position between the serfs and the freemen. A serf could not be sold, but could be transferred along with the property to which he was attached. A serf could obtain his freedom by purchase, by residing for a year and a day in a borough or by military service. By these various means the serf population gradually decreased, and in most parts of the Continent had disappeared by the fifteenth century. Serfdom in England and Scotland was extinguished very gradually, existing almost in its original form as late as 1574; and even in the eighteenth century a species of serfdom existed among Scottish miners. Serfdom in Russia did not originate in feudalism, but in royal enactment; it was abolished by a manifesto of Alexander II, on March 17, 1861.

SERGEANT, *sahr'jent*, in a military company or in a marine corps, the highest non-commissioned officer, ranking above a corporal. He is below a second-lieutenant, who is the lowest commissioned officer. The top sergeant, or sergeant-major, ranks in authority over all other sergeants in a company.

SERGEANT-AT-ARMS, an officer of a legislative body or of any deliberative assembly. His duty is to execute the orders of its officers and to preserve order. In legislative bodies the mace (which see) is the emblem of his authority.

SERINAGUR, *se'rena gur*, or **SRINAGAR**, INDIA, capital of Kashmir, situated in the Kashmir valley, on both banks of the Jhelam River, 170 miles northeast of Lahore. It is an exceedingly picturesque town when seen from a distance, but the streets are narrow and dirty and contain but little of interest. In the environs are beautiful gardens, and also the lake made famous by Moore in his *Lalla Rookh*. The chief industries are the manufacture of shawls and

rugs, the production of attar of roses and the making of silver articles. Population, 1931, 173,649.

SEROUS MEMBRANES, certain double membranes in the human body, as the pleura, the pericardium and the peritoneum, which form a sort of closed sac surrounding certain organs, the interior surfaces of the sac secreting a small quantity of serous fluid. Serous membranes line cavities not exposed to the air. Their chief function is to allow free action to the organs and prevent the injurious effects of friction. The synovial membranes of the joints belong to this class. These membranes are subject to various diseases. See **PLEURISY**.

SERPENT. See **SNAKE**.

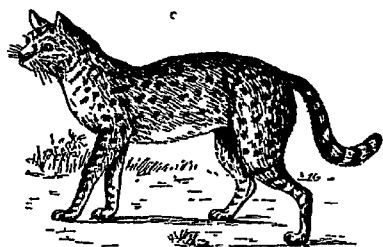
SERPENT CHARMING, a so-called art of great antiquity, confined in practice to Egypt and the East. Although it is a common practice of the charmer to extract the fangs before exhibiting the snakes, this is not always done. The instrument usually employed in serpent charming is a kind of pipe, which is varied by whistling and the use of the voice. The effect of this medley of sounds is to entice the serpents from their holes so they may be pinned to the ground with a forked stick. In India and other Eastern countries the art of serpent charming is an hereditary profession. In addition to the evident power music has upon the serpents, they appear to be influenced in a marked degree by the eye of the charmer, who controls them merely by fixing his gaze upon them.

SERPENTINE, *sur'pen-tin*, a rock composed of magnesia, silica and water, ranging in color through varying shades of green to red, yellow or brown. It takes its name from its mottled-green appearance, which was formerly supposed to resemble the skin of some serpents. Much of serpentine is veined or spotted with streaks of white; these varieties are known in the United States as *verde antique* marble. Serpentine takes a high polish and is quite extensively used in finishing for the interiors of public buildings. It is not a good stone for exteriors, because it contains more or less iron, which, on weathering, discolors the stone. It is found in Switzerland, Italy and a number of localities in the United States.

SERUM THERAPY, the treatment of disease by means of blood serum, containing germs which by creating antitoxins in the

blood of the patient render him immune or enable him to resist a disease already acquired. Cultures of the specific germ are made, and some animal, usually a healthy horse, is inoculated. The serum from this animal is tested on a rabbit, for instance, and if found to protect the little animal from inoculation with active disease germs, the serum is felt to be safe for human beings. Vaccination for smallpox is an example of vaccine therapy. Serum therapy has been used with varying success in pneumonia, cholera, typhoid, diphtheria and several other bacterial diseases and promises great results in the fight against disease. See **GERM THEORY OF DISEASE**.

SERVAL, *sur'val*, a large South American wild cat, about three feet in length. Its general body-color is a bright golden, tinged with



SERVAL

gray and marked with black spots. Its tail is sixteen inches long. The serval, or *tiger cat*, as it is sometimes called, is easily tamed, if captured when young. Its fur commands high prices.

SERVETUS, *ser've'tus*, MICHAEL, or MIGUEL SERVETE (about 1511-1553), a Spanish physician, scholar and theologian, who was burned at the stake as a heretic. He was born at Tudela, in Navarre. At the age of seventeen he was sent to Toulouse to study civil law, but soon devoted his interests to theology. He incurred the enmity of Roman Catholics and Protestants during the Reformation. After the publication of his *Christianismi Restitutio* (Restoration of Christianity) in Vienna, he was arrested for heresy and imprisoned, but escaped to Naples. He was arrested at Geneva, however, on a charge of blasphemy and heresy, and his various writings were sifted in order to insure his condemnation. The divines of all the Protestant Swiss cantons unanimously declared for his punishment, and Calvin was

especially urgent and emphatic as to the necessity of putting him to death. Servetus is numbered among the anatomists who made the nearest approach to the doctrine of the circulation of the blood before the time of Harvey.

SERVIA. See **SERBIA**.

SERV'ICE, ROBERT WILLIAM (1876-), a Canadian poet and novelist, whose vigorous ballads of the Northwest have gained for him a secure place in Canadian literature. He was born at Preston, England, and educated at Glasgow, Scotland. In 1897 he emigrated to Canada and traveled extensively through the West, encountering experiences which later supplied rich literary material. In 1905 he joined the staff of the Canadian Bank of Commerce and later worked in the bank's branches at White Horse, Yukon Territory, and at Dawson City. His close contact with the vigorous elemental life and wild scenes in the sub-arctic regions enabled him to write about them with accuracy and feeling. The men and conditions he pictures and his literary workmanship give him a place in Canadian literature somewhat like that of Bret Harte's in American literature. His books of verse include *The Spell of the Yukon*, *Songs of a Sourdough*, *Ballads of a Cheechako*, *Rhymes of a Rolling Stone* and *Rhymes of a Red Cross Man*. He has written two novels, *The Trail of '98* and *The Pretender*. He served for two years as ambulance driver in France in the World War.

SERVIVS TULLIVS, *ser'vi'us tul'i'us*, the sixth of the seven legendary kings of early Rome. According to tradition he was the son of a slave who was given by the elder Tarquin to his wife. He married Tarquin's daughter, and on the death of his father-in-law (578 B. C.) ascended the throne. He established many civil rights and institutions, greatly improved the condition of the common people, thereby antagonizing the patricians, and extended and beautified Rome.

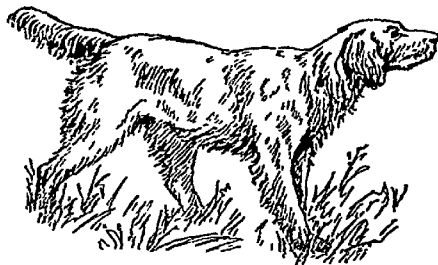
SESAME, *ses'a me*, **GRASS**. See **GAMA GRASS**.

SETI I, *sa'te*, an Egyptian king, the second Pharaoh of the nineteenth dynasty (1462 to 1288 B. C.) and father of Rameses II (see **RAMESSES II**). On the walls of the Hall of Columns at Karnak, which he built, are described his campaigns whereby he established the power of Egypt over a large portion of Western Asia. He built the Temple of Osiris at Abydos.

SETON, ERNEST THOMPSON (1860-), a popular author, artist and lecturer, born in Shields, England. Much of his early life was spent in the Canadian backwoods and on the Western plains. He was educated at the Toronto Collegiate Institute and at the Royal Academy in London, England, and studied six years in Paris. In 1901 he organized the Woodcraft Indians, for boys, a society which later became a nucleus for the Boy Scouts (which see). In 1891 Seton became official naturalist to the government of Manitoba. He was one of the chief illustrators of the Century Dictionary and has illustrated many books on birds and animals.

He is best known as the author and illustrator of stories about animals. These include *Wild Animals I Have Known*; *The Biography of a Grizzly*; *Lobo*, *Rag and Vizen*; *Lives of the Hunted*; *Two Little Savages*; *Monarch*, the Big Bear, and *Animal Heroes*, all dealing with animal life in a way which was original with the author. The truth of Seton's accounts of animals has been questioned by many naturalists, but the stories have certainly aroused a new interest in animals and led to increased study of their habits. Seton has contributed numerous articles and illustrations to magazines and scientific publications and delivered many lectures. He claims to have organized the Boy Scouts, but this distinction really belongs to Daniel Carter Beard (which see).

SETTER, a handsome hunting dog weighing from fifty to sixty pounds and having soft, silky hair, sometimes wavy, and droop-



SETTER

ing ears. Three breeds are recognized. These are the English, which is white, with black markings; the Gordon, rich glossy black, with reddish-brown markings; the Irish, a uniform chestnut color. The dogs are taught to raise a forefoot to indicate game. They are intelligent and easily managed.

SEVEN PINES. See FAIR OAKS, BATTLE OF.

SEVEN SLEEPERS, according to a sixth-century story, were seven Christian youths of Ephesus, who, by a command of the Emperor Decius, were imprisoned in a cave in Mount Celion, in which they had taken refuge. Here they fell into a deep slumber, from which they were awakened by a shepherd after a lapse of about two hundred years. On emerging from the cave, during the reign of Theodosius II, they were surprised at changed conditions everywhere, as was the populace over their strange visitors. The youths related their story to the multitude, gave it their blessing, and died. The Mohammedans have a similar legend.

SEVENTEEN-YEAR LOCUST. See CICADA.

SEVENTH DAY ADVENTISTS, the largest sect of the Adventists, numbering about 83,000 members in America and supporting more than 2,000 churches. According to their doctrine, the seventh day of the week, the Christian Saturday, is the Sabbath. They believe that the dead sleep till the day of judgment; that the unsaved are destroyed; that the care of bodily health, total abstinence and the eating of vegetable food are religious duties. They have established sanitariums in various states, and their missionary work extends into almost every country in the world. In the United States their headquarters are at Takoma Park, a suburb of Washington, D. C.; previous to 1903 the headquarters were at Battle Creek, Mich. Their publications are numerous and embrace discussions of the Bible and of their own peculiar doctrines. The sect supports more than seventy denominational schools.

SEVEN WEEKS' WAR, a struggle, in 1866, between Prussia and Italy on one side and Austria and its allies on the other, which determined that Prussian influence was to be predominant in Germany. The issue was forced by Bismarck, who used the Schleswig-Holstein controversy as a pretext. The Prussians under Von Moltke were from the first victorious, and after the Battle of Königgratz, or Sadowa, Austria was obliged to sue for peace, which was concluded in the Treaty of Prague.

Related Articles. Consult the following titles for additional information:

Austria-Hungary
Bismarck-Schön-
hausen

Moltke, Count von
Sadowa, Battle of
Schleswig-Holstein

SEVEN WISE MEN OF GREECE, men who are largely shrouded in obscurity who lived in the sixth and seventh centuries before Christ. The generally-accepted list of these sages and philosophers includes Periander, Thales, Solon, Bias, Chilon and Cleobulus. Maxims of prudence and elementary morality are regarded as embodying a summary of their wisdom. Among these maxims are "Know thyself," "Nothing in excess," "Consider the end," "Forethought in all things."

SEVEN WONDERS OF THE ANCIENT WORLD, a group of seven most notable works of art of antiquity, celebrated for their beauty and colossal size. The earliest list of these was compiled from numerous guide books of the Greeks, and varies but little from the later and more authentic list found in the work of Philo of Byzantium. This latter includes the Pyramids of Egypt; the Hanging Gardens of Semiramis, at Babylon; the statue of Zeus, or Jupiter, by Phidias, at Olympia; the Temple of Artemis, or Diana, at Ephesus; the Mausoleum at Halicarnassus; the Colossus of Rhodes; and the Pharos, or Lighthouse, at Alexandria.

Seven Modern Wonders. Science takes precedence over art in the list of seven wonders of the modern world, which is devoted to its great inventions and discoveries. Leading scientists include the following seven as the most marvelous scientific discoveries of modern times: the wireless telegraph, invented by Marconi; the telephone, invented by Reis of Germany and Gray and Bell of the United States; the airplane, invented by the Wright brothers, of Ohio; the discovery of antiseptics, by Sir Joseph Lister; radium, discovered by Pierre and Marie Curie; the X-ray discovered by Roentgen; and spectrum analysis, discovered by Sir Isaac Newton.

Related Articles. The following articles give specific information about the ancient and modern wonders:

Airplane
Colossus
Flying, Story of
Hanging Gardens
of Babylon
Mausoleum
Pharos

Pyramids
Radium
Roentgen Rays
Spectrum Analysis
Telegraph, Wireless
Telephone

SEVEN YEARS' WAR, a famous war between Prussia and other European powers, which lasted from 1756 to 1763. As the result of a war with Prussia, Maria Theresa of Austria had been forced to cede Silesia to Frederick the Great. To recover her lost

territory she concluded an alliance with Russia, secured the support of Poland and Saxony and attempted to form a closer union with France. In the meantime war broke out between France and England (1755), and George II, in order to protect his German states, concluded an alliance with Prussia, a move which decided France to aid Austria. Being informed of these negotiations, Frederick resolved to anticipate his enemies. In August, 1756, he invaded Saxony, occupied the chief towns and compelled the Saxon army to surrender. This step created a stir in the European courts, and in 1757 Austria, Russia, France, Sweden and the German Empire were in arms against Frederick, while he had no allies but England and a few German states. In 1757 Frederick marched into Bohemia and gained a bloody battle at Prague. Soon after this, however, the Austrians, under Daun, defeated Frederick at Kolin, relieved Prague and forced the Prussians to retreat to Saxony. The French army, after defeating Frederick's allies under the Duke of Cumberland, united with the imperial forces. Frederick met them at Rossbach and routed both armies, then hurried back to Silesia, which was occupied by the Austrians, and vanquished a superior army under Daun at Leuthen, thus recovering Silesia. While Frederick was thus occupied in the south and west, his general, Lehwald, had successfully repelled the Swedes and Russians on the north and east.

The next campaign was opened in February, 1758, by Ferdinand, Duke of Brunswick, who, at the head of Frederick's allies, opposed the French in Lower Saxony and Westphalia. He defeated the French at Crefeld in June and ultimately drove the enemy beyond the Rhine. Frederick defeated the Russians at Zorndorf and was defeated in turn by Daun at Hochkirch, but before the end of the year he drove the Austrians from Silesia and Saxony.

In 1759 Frederick suffered at Kunersdorf a defeat such as he had never sustained before, and his position became extremely precarious. The British victories over the French helped matters somewhat, and the campaign of 1760 opened well for him. George II of England died in this year, however; Pitt was removed from power and Prussia thus lost its only ally. It seemed as if nothing could save it, but in 1762, when Frederick's fortunes were at their worst,

Elizabeth of Russia died and was succeeded by Peter III, who was an enthusiastic admirer of Frederick. Russia made a treaty with Prussia, but Peter was deposed before Russia could lend Frederick any substantial aid. However, Russia did not again join Austria, and as both sides were practically exhausted, peace was concluded at Hubertsburg in 1763. Matters were adjusted as they had been before the war, and Frederick was allowed to retain Silesia. The struggle between France and England in Europe was accompanied in America by the conflict known as the last French and Indian War (See FRENCH AND INDIAN WARS).

SEVERN, *sev'ern*, the second largest river in England. It rises in Wales, and after a circuitous easterly and southerly course of about 210 miles, through England, it empties into the British Channel through an estuary under which runs a tunnel about four miles long. It is navigable a distance of 180 miles. Below Gloucester the banks are so low that destructive inundations have frequently occurred. Worcester and Shrewsbury are two other important cities on the Severn.

SEVERUS, *sev'erus*, **LUCIUS SEPTIMIUS** (146-211), a Roman emperor. After the murder of Pertinax in 193 he was proclaimed emperor by his troops, and is therefore included among the "Barracks Emperors." Severus marched to Rome to subdue the partisans of Julianus, who had obtained the throne from the praetorians by bribery. On his approach, Julianus was assassinated by his own soldiers. Severus banished the praetorians and rid himself of the rivalry of Albinus, commander of the Roman forces in Britain. He then marched to the East against Pescennius Niger, who had also been elected emperor by a powerful army. After many obstinate battles, Niger was routed on the plains of Issus. Having sacked Byzantium and conquered several Eastern peoples, Severus returned to Rome. After a successful campaign against the Parthians, he next subdued an insurrection in Britain. To protect the people of the south from incursions of the Highlanders, he built a stone wall from the Tyne to the Solway Firth. See ROMAN WALLS.

SEVILLE, *se vil'*, SPAIN, is situated on the Guadalquivir River, sixty-two miles north-northeast of Cadiz. It is built in Moorish style, has narrow streets, lined with old Moorish houses, which are usually built around

interior courtyards with fountains in the center. Many of the dwellings are of two stories, and nearly all of them are white. The city is notable for its abundant and beautiful vegetation. It was formerly enclosed by a wall, but only a few remains of this are now visible. The principal parks or squares are the Plaza de San Fernando and the Plaza de Triunfo, upon which is the cathedral. The city also has a number of boulevards, noted for their beauty. Among the buildings of note are the Cathedral of Seville, which ranks next to Saint Peter's at Rome in size; the Giralda, the Campanile, in the form of a square tower over 300 feet in height and dating from the sixteenth century; the palace of the Moorish kings, or the Alcazar, and the chapel of the Catholic kings.

The chief educational institutions include the University of Seville, the provincial school of art, the provincial museum and the provincial library, which has over 80,000 volumes, and the Columbian Library, founded by the son of Columbus. The civil hospital is noted as one of the largest institutions of the kind in the world. The leading industries include the manufacture of tobacco, silk, ironware, soap and chocolate. The city has an important trade with the surrounding country. It is one of the oldest cities of Spain and was a place of considerable importance under the Romans. Next to Madrid it is the most important center of literature, art and education in Spain. During the eleventh century it was the capital of a Moorish state. Later it was captured by Saint Ferdinand of Castile, and was for a long time the capital of the Castilian dominion. At the time of the discovery of America, it was the leading commercial port of Spain. Population, 1934, 235,761.

SEVRES, *sev'vr'*, **PORCELAIN**, an artistic pottery having the general effect of a cameo, though possessing greater delicacy and richness of color. In its construction the *pâte-sur-pâte* (or layers) method is used, original with this ware. Sèvres porcelain has been highly prized since the first days of its manufacture at Vincennes, in 1745. In 1756 the manufactory was purchased by Louis XV, removed to Sèvres, and placed under state supervision; from the fact of its location here the name was derived. Many noted artists were employed to decorate the plaques, vases and ornaments which are still the pride of collectors. In recent years, how-

ever, very clever imitations have been made in Germany and England, and these have flooded the markets.

SEWAGE AND SEWERAGE. Sewerage is the system of pipes and conduits for conveying away from houses and factories the waste matter known as *sewage*, and depositing it at safe distances from cities and towns. Sewage is made up of solid and liquid matter from houses, the fluid waste from domestic and manufacturing operations, generally much of the surface drainage and sufficient water to carry away the waste. In small villages and in farming communities, each house disposes of its own sewage, usually in the soil, and this under ordinary circumstances is a safe method; but wherever people are crowded together it is necessary to dispose of all refuse matter promptly and completely (see **GARBAGE**). The customary way, especially in the smaller cities, is to float the sewage off in airtight tubes, to such a distance that it will be harmless. Except in very level countries, the force of gravity is sufficient to carry away the sewage, but in some places pumping stations are necessary to distribute it properly. It is evident that plenty of water is necessary to carry away the refuse successfully, and in many places drains are so arranged that surface water is conducted to the sewers, where it assists in carrying off the solid matter. Such a plan, however, is open to objections, since at times the sewer pipes are partially empty and poisonous gases collect and escape through the drainage openings. A better plan is to keep the drainage system separate from the sewers.

Small sewers are usually made of terra cotta or vitrified clay, but when they are more than two feet in diameter, iron pipes are used or brick sewers are constructed. In large cities the more expensive stone masonry and concrete are substituted for brick. The sewers should be properly ventilated, so that noxious gases may not rise through the pipes to the houses and cause sickness. To prevent the escape of sewer gas into dwellings and factories all drain pipes have a u-shaped bend called a *trap*, in which water constantly stands. Yet the danger from gas is not so great as the danger from polluting the soil or water supply of the town with the sewage. If the waste matter can be carried far out into some large body of water, it may be deposited with safety, because the water in time disinfects the refuse; but where the

sewage is thrown into small streams or small bodies of water, the possibilities for conveying disease to other places, if not to the one whence the sewage originated, can scarcely be overestimated.

The sewerage systems of great cities such as London, Paris, New York and Chicago involve some of the most difficult engineering problems found in any class of construction. Some of the mains in these systems are from sixteen to twenty feet in diameter. In order to dispose of the sewage Chicago excavated a drainage canal at an expense of more than \$50,000,000.

SEWARD, su' ard, WILLIAM HENRY (1801-1872), an American statesman, Secretary of State in Lincoln's Cabinet and purchaser of Alaska for the United States. He was born in Florida, Orange County, N. Y., and was educated at Union College. After practicing law for a number of years, he drifted into politics. In 1830 he was elected a member of the New York senate, in 1838 became governor of his state, and in 1849 entered the United States Senate. There he became the friend and adviser of President Taylor and distinguished himself by his firm resistance to the extension of slavery, opposing in eloquent speeches the Compromise of 1850 and the Kansas-Nebraska Bill.

In 1860 he was a candidate for the Presidential nomination, but having been defeated in the convention by Abraham Lincoln, he exerted himself to secure Lincoln's election and was later appointed Secretary of State. In this post he discharged his duties with great ability. He adjusted the Trent affair (see **TRENT AFFAIR**) and the Alabama Claims (see **ALABAMA, THE**), secured the withdrawal of the French from Mexico, and purchased Alaska from Russia. He was dangerously wounded in April, 1865, when Lincoln was assassinated, by an accomplice of Booth. He served as Secretary of State under President Johnson, and continued in public life until the inauguration of President Grant in 1868.



WILLIAM HENRY SEWARD

FREQUENCIES OF ELECTROMAGNETIC WAVES IN KILOCYCLES PER SECOND

COSMIC RAY 1,000,000,000,000,000,000

100,000,000,000,000,000

GAMMA RAY 10,000,000,000,000,000

1,000,000,000,000,000

X-RAY 100,000,000,000,000

10,000,000,000,000

ULTRA VIOLET 1,000,000,000,000

VISIBLE RAYS 100,000,000,000

HEAT RAYS 10,000,000,000

1,000,000,000

$$E = h\nu$$

PLANCK 1900

100,000,000

10,000,000

HERTZ 1,000,000

$$\frac{d^2y}{dx^2} = -\frac{1}{\lambda^2} \frac{d^2y}{dx^2}$$

100,000

10,000

RADIO BROADCASTING 1,000

100

10

1

